MARINE REVIEW.

VOL. XVI. CLEVELAND, O., JULY 15, 1897. No. 3.

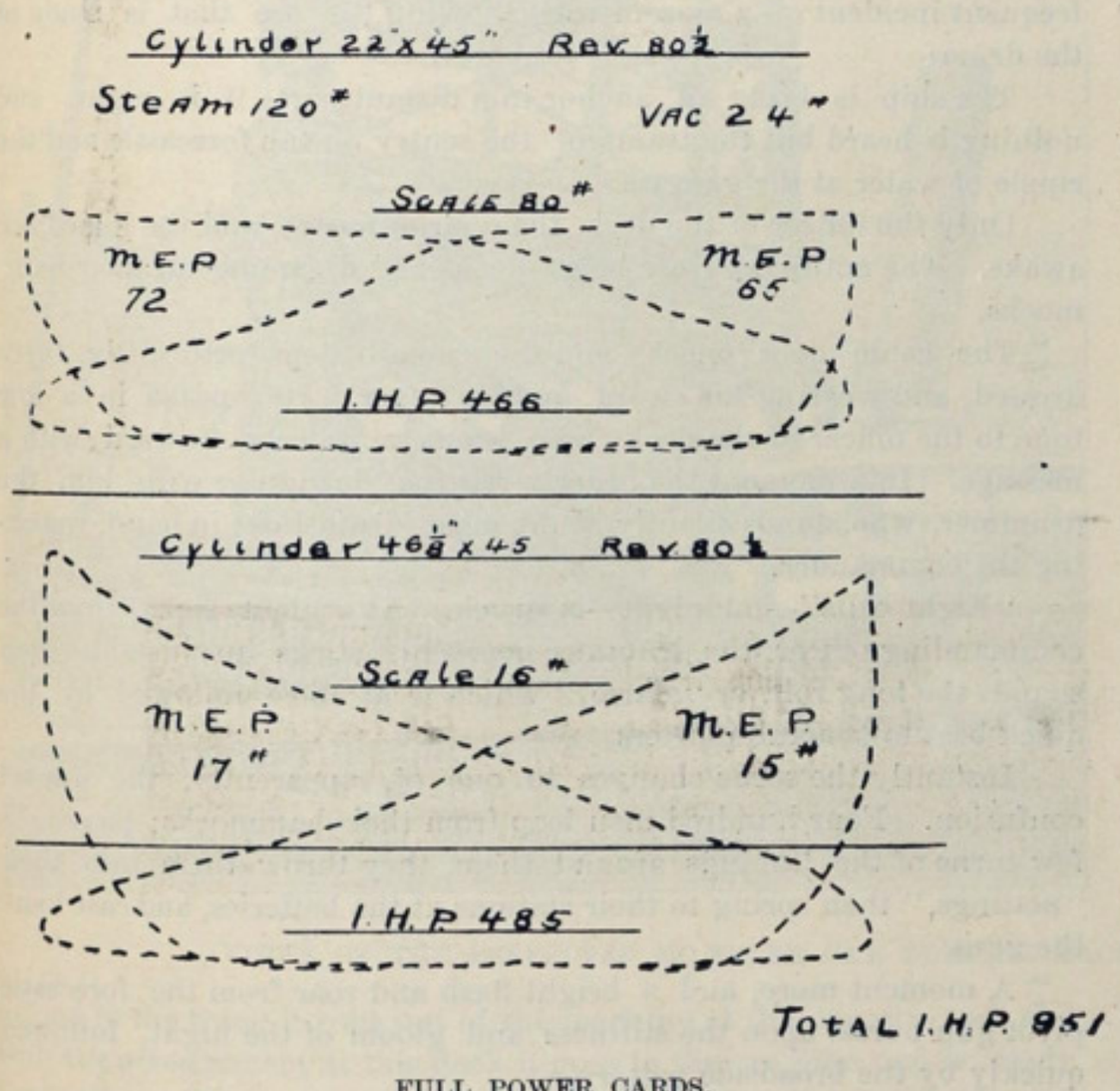
A Most Economical Compound Engine.

THE KALIYUGA'S ENGINE DEVELOPES 704 HORSE POWER ON A COAL CONSUMPTION OF 1.86, AFTER BEING FITTED WITH THE HOWDEN HOT DRAFT.

It is somewhat of a revelation to learn that a compound engine built ten years ago, can be made more economical and as efficient as a number of triple expansion engines of more modern type. When the St. Clair Steamship Co. contracted with the Dry Dock Engine Works for the equipment of the Howden system of hot draft, they had studied the matter so thoroughly that they knew what to demand. But when it was known that they required a coal consumption equal to that of most of the triple expansion engines, prominent engine builders said it could not be done, and that the contractors would fail. The requirements will make the results shown in the report interesting, and the fact that the test was made for the owners of the Kaliyuga gives an additional value to it, as it is believed to be the first test made on the lakes when two parties were represented. The requirements were as follows:

Minimum h. p. 700. Coal consumption 2.25. The results obtained were:

Minimum h. p., 704. Coal consumption 1.86. Maximum h. p. 941. Coal consumption 1.92. It is not mentioned in the report that the Kaliyuga was towing the Fontana. The steamer's cargo consisted of 2,221 tons and the barge's 2,207 tons, making a total of 4,428. Figuring both cargoes it is found that the coal consumption per ton cargo per mile is .035 pound, or .56 ounce. The average consumption of three of the most modern lake steamers per ton per mile is .064 pouds, and that of what was considered the most economical is .052 pounds. This may sound revolutionary after the advent of the triple expansion engine, but it is a fact nevertheless.



FULL POWER CARDS.

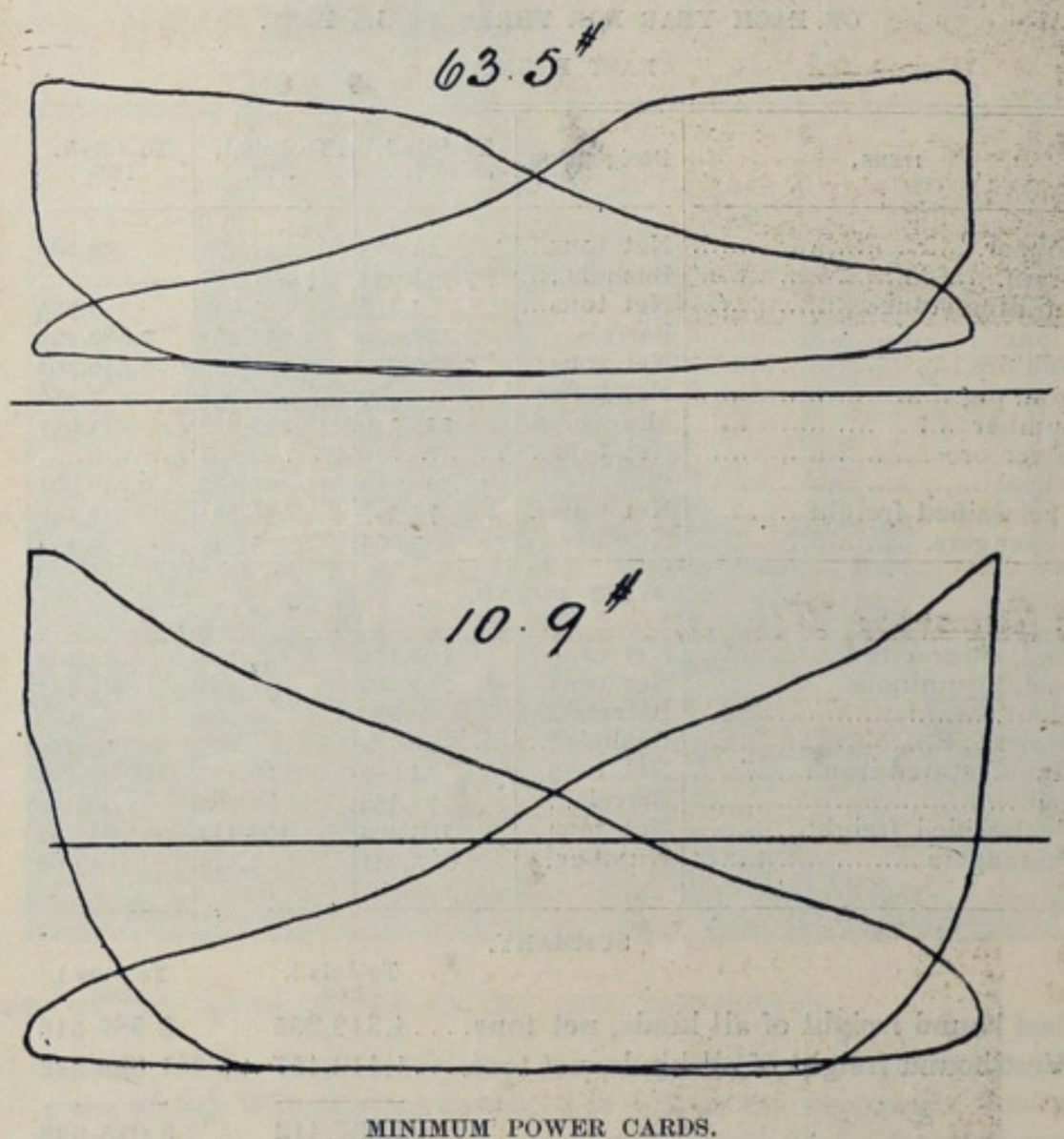
The Review is not at liberty to publish the Kaliyuga's fuel consumption before the Howden draft was added, but the saving in fuel for the season would make a very nice dividend on the valuation of the steamer. The owners are to be congratulated on their judgment in making such requirements, and the Dry Dock Engine Works staff should be complimented for meeting them. The report by Mr. Robert Logan follows:

"Messrs. Calder and Mattsson represented the Dry Dock Engine Works, and myself the St. Clair Seamship Co. This gave us a staff of three operators, so that the scope of the tests was nescessarily limited and confined cheifly to ascertaining if the contract stipulations have been obtained, viz: a minimum of 700 H.P. under ordinary working conditions with a maximum consumption of 2.25 lbs. of Pittsburg "run of mine" coal per I.H.P. per hour."

"The tests were begun at 10 p. m. on the 4th of July, leaving Detour, and continued without intermission until 4 a. m. of the next day, but previous to starting the tests the vessel was stopped at Detour, the air pump examined and one of the bucket valves which we found broken was replaced. This opportunity was also taken to "blow" the boiler tubes."

"The engines were run during this trial just as the engineer usually sets them for running with the vessels loaded, except that we used slightly more injection water than he does, a change which did not improve the results as we afterwards discovered."

"Indicator cards were taken every half hour and other particulars noted at same time; the coal was weighed into the firehold in 200 lb. lots and carefully tallied; the ashes were not weighed nor taken into account, and the fires were in the same condition five minutes after the trial as they were at the commencement."



MINIMUM POWER CARDS.

"The particulars of the machinery are as follows:

Diameter of Cylinders	H. P. 22"—L. P. 46⅛."
Ratios of Cylinders	1 to 4.398.
Stroke	45 inches.
Piston Rods	4¾" diameter.
Main Boiler	12' 6" diameter x 12' 0" long.
Working pressure	130 lbs.
Furnaces	2 at 46" diameter.
Grate surface	42.2 sq. ft.

"The mean results of the 6 hours' run and the 13 sets of indicator cards were as follows:"

1.	Steam pressure	117 to 120 lbs.
2.	Receiver pressure	12 lbs.
3.	Vacuum (by guage)	25.25 inches.
4.	High pressure, cylinder mean pressure,	63.8 lbs.
5.	Low " " " "	10.8 "

[Continued on page 10.]

Sault Canal Figures.

The movement of freight east and west bound through the Sault canal to July 1, 1897, as compared with the movement to the same date in 1896 shows a shortage of some 420,000 tons. The movement of coal shows a shortage of about 100,000 tons, ore 365,000 tons, and grain and wheat about 3,000,000 bushels. Of course the present month will increase the coal shortage. The end of July will see the season half finished with a little over a third of the season's tonnage movement completed.

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To July 1, 1897.	To July 1, 1896.	To July 1, 1895.
Coal, anthracite, net tons	108,179	136,191	81,304
Coal, bituminous, net tons	761,902	831,403	229,757
Iron ore, net tons	2,566,910	2,931,703	2,540,702
Wheat, bushels	15,740,713	19,101,185	6,246,961
Flour, barrels	2,467,279	1,951,565	2,682,225

The total movement of freight of all kinds to and from Lake Superior to July 1 is 5,015,928 net tons, against 5,437,412 net tons on July 1, 1896, or a decrease of nearly 420,000 tons. The various items making up these totals are shown in the following table:

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO JULY 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To July 1, 1897.	To July 1, 1896.	To July 1, 1895.
Copper	Net tons	44,385	41,271	36,180
Grain	Bushels	7,734,933	7,431,201	.....
Building stone	Net tons	2,818	5,030	8,773
Flour	Barrels	2,467,029	1,951,565	2,682,225
Iron ore	Net tons	2,566,910	2,931,703	2,540,702
Iron, pig	Net tons	200	7,591	7,456
Lumber	M. ft. b. m.	225,319	227,852	223,957
Silver ore	Net tons	.....	.....	.....
Wheat	Bushels	15,740,713	19,101,185	6,246,961
Unclassified freight	Net tons	75,305	56,261	42,131
Passengers	Number	3,003	3,747	3,434

WEST BOUND.

Coal, anthracite	Net tons	108,179	136,191	81,304
Coal, bituminous	Net tons	761,902	831,403	229,757
Flour	Barrels	250	62	150
Grain	Bushels	.....	1,109	18,250
Manufactured iron	Net tons	34,053	26,477	20,439
Salt	Barrels	72,454	82,765	90,350
Unclassified freight	Net tons	103,464	104,414	83,742
Passengers	Number	3,041	3,544	3,066

SUMMARY.

	To July 1, 1896.	To July 1, 1897.
East bound freight of all kinds, net tons	4,318,255	3,987,516
West bound freight of all kinds, net tons	1,119,157	1,028,412
	5,437,412	5,015,928

The total number of vessel passages to July 1, 1897, was 4,883, and the registered tonnage 4,923,065.

Navigation Information.

Masters of large steamers continue to complain of the obstruction at the entrance to Conneaut harbor. Capt. F. Stanton of the James Watt, Capt. E. M. Smith of the Bessemer, and Capt. H. Cummings of the Italia, and several others state that it is a serious menace to safe navigation. Col. A. J. Smith, engineer in charge, says that there is no appropriation available for removing it. It would seem that it might be declared an obstruction to navigation, the same as a vessel sunk at that place would be, and removed accordingly. It seems to be the general testimony of captains entering there that it is liable to wreck some vessel, and that would probably close the harbor. Such an accident would be seriously felt, now that so many harbors have overloaded docks.

Capt. James Parsons of the steamer Hebard writes Geo. L. McCurdy, the insurance man as follows: "As I am almost a constant trader from Lake Superior to Tonawanda, and as I consider the Niagara river the most dangerous piece of navigation that I have to contend with, I note very carefully the trend of the current, etc., in different places in that piece of water, and as a consequence I cannot see the reason that on the Germania park cut we have three black buoys instead of red ones. I am told to run close to the black stakes while the current sets you toward them and you often have a strong breeze from the west to help it. I think that every master, (especially with a tow), would rather hug red stakes than black ones in that locality."

Captain James Owens, master of the steamer H. R. James, writes as follows: Five miles E. N. E. from Waugoshance lighthouse lies a sunken vessel and her spars point S. S. E. This is a dangerous wreck for it lies in the track of all steamers."

The Cleveland branch hydrographic office has received the following notice to mariners from Capt. William S. Hoag, steamer Thomas Wilson: "On July 10, 1897, at 10:40 a. m., Middle island, Lake Huron, bearing SW by W, distant three miles, the steamer Thomas Wilson passed a raft built of logs with planks fastened on top of logs with wooden pins for a deck. The raft was made from sixteen or eighteen-foot logs, sufficiently heavy to damage an iron steamer striking bow on."

Midnight Beat to Quarters.

Lieut. Con Marrast Perkins, of the United States Marine Corps, contributes an article on "The Last of the Drums" to the July "St. Nicholas." The author laments the gradual passing of the drum from use in the army and navy. He gives the following account of a frequent incident on a man-of-war, showing the use that is made of the drum:

The ship is lying at anchor in a distant port; it is night, and nothing is heard but the tramp of the sentry on the forecastle and the ripple of water at the gangway.

Only the officer of the deck, the quartermaster, and the guard are awake. The entire crew are below decks and dreaming in their hammocks.

The cabin door opens, and the captain steps forth softly, fully dressed, and wearing his sword and revolver. He speaks in a low tone to the officer of the deck, who sends an orderly forward with a message. In a moment the orderly returns, bringing with him the drummer, who stands silently at the mast, drumsticks in hand, watching the commander.

"Eight bells"—midnight—is struck. At a silent signal from the commanding officer, the drummer poises his sticks an instant, then sounds the long roll, or "alarm," which is at once followed by the quick beat to general quarters.

Instantly the scene changes to one of, apparently, the utmost confusion. Four hundred men leap from their hammocks; passing a few turns of the lashings around them, they throw them into their "nettings," then spring to their stations at the batteries, and cast loose the guns.

A moment more, and a bright flash and roar from the forecastle pivot gun bursts upon the stillness and gloom of the night, followed quickly by the broadside battery.

Each gun is fired once, a blank charge, but enough to show that the gun is in good order and ready for service.

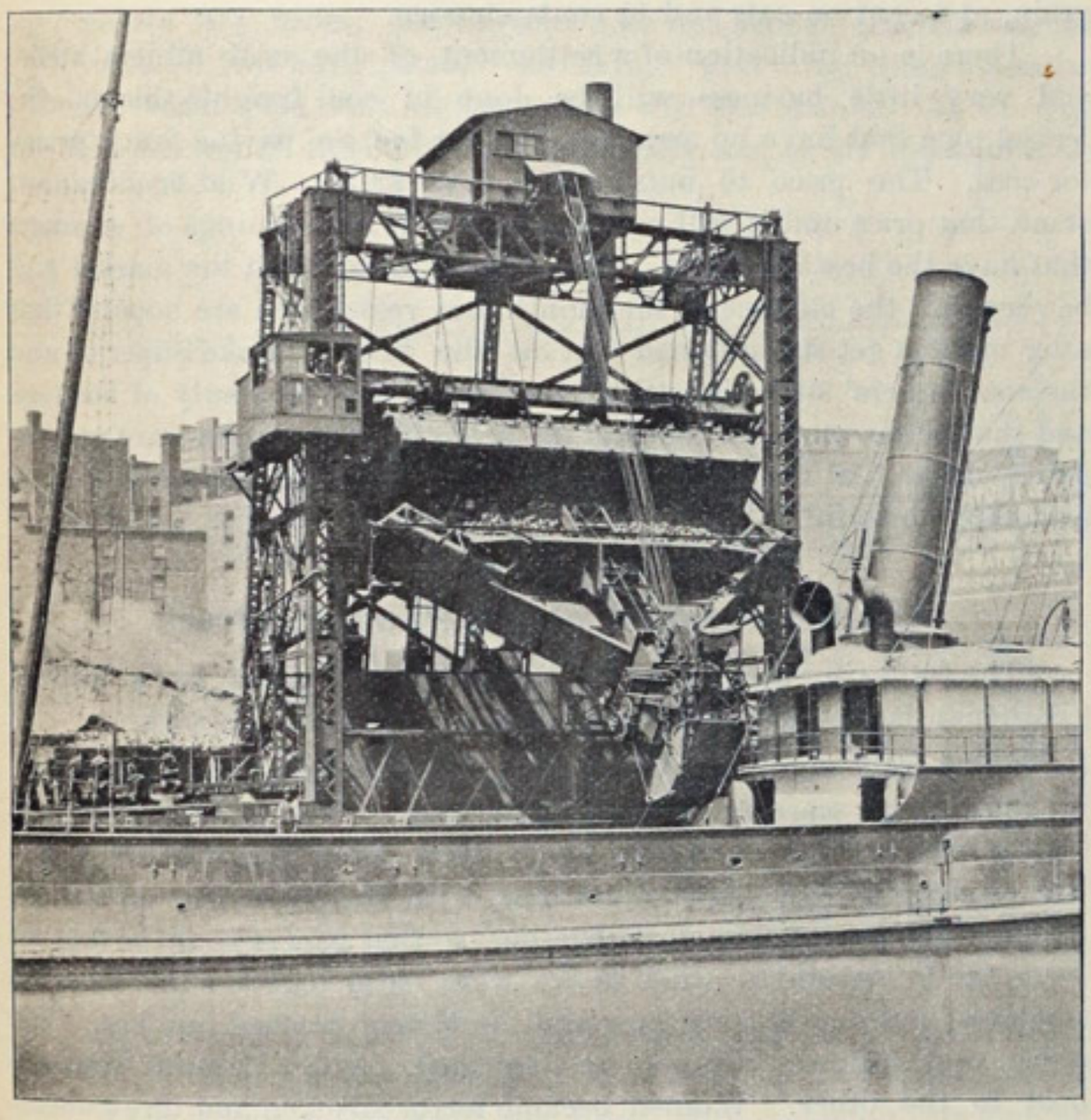
As suddenly the pandemonium subsides; confusion gives place to silence and order, and not a sound is heard; but the battle lanterns flashing along the crowded deck reveal the well-disciplined crew standing at their quarters, every man equipped with cutlass and pistol, silent and alert. Sponges, rammers, supply-boxes, and battle-axes litter the deck; everything is provided and ready as for action; while the captian, accompanied by the executive officer (the 1st lieutenant), with an orderly bearing a lantern, makes a thorough inspection fore and aft and below, including the powder division, magazines, and shell rooms, to see that nothing is lacking which would be required in real action.

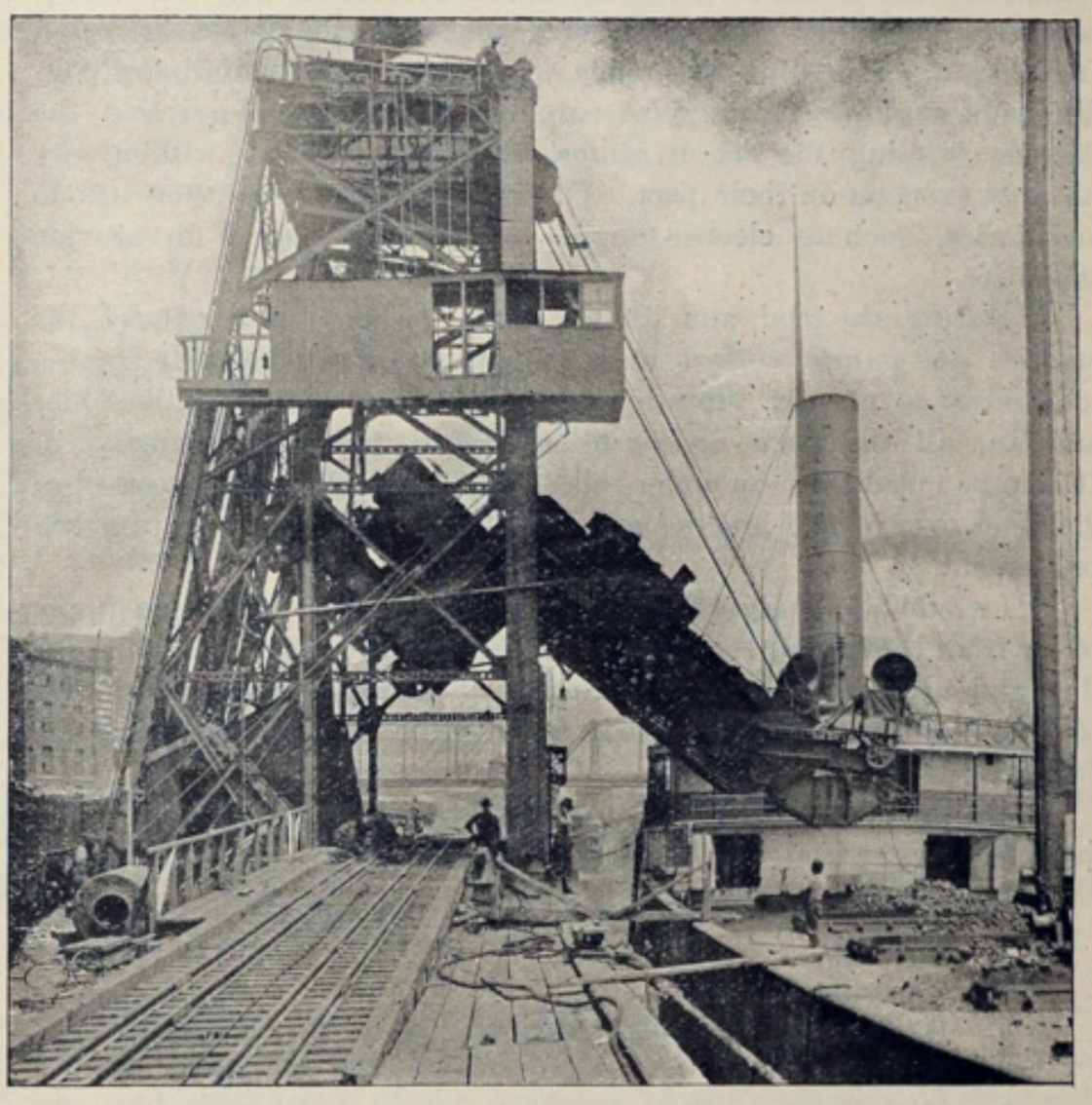
At the touch of the drum the ship has been changed from death-like stillness to readiness for battle, every officer and man at his station, armed, silent, expectant—and all in less than three minutes!

A one fare rate to Chicago and return is offered via the Nickel Plate road for the unveiling of Logan's Monument July 22nd. 185-21

The Rapidest Cargo-Handling Apparatus in the World.

The McMyler car dumping coal loading machine erected for the Valley Coal Transfer Co. near Seneca st. bridge, Cleveland, possesses a number of new features and advantages over similar plants of the same style previously erected. One of the most important is the trimming device attached to the chute at the end of the apron. It has a capacity of three tons and as may be seen by the illustrations is scoop shaped either end opening, and thereby trimming to either side of vessel. It is practically automatic and is even more rapid than other parts of the machine. Another feature is the bulk-head in the apron or receiver and the extension of the receiver past the ends of the car, so that the coal at the ends delivers before or at the same time as that in the center of the car. The traps that control the movement of the coal to the bucket for trimming and lowering device are valuable parts. All these additions overcome breakage of coal and also trim the coal in a most satisfactory manner. The speed of this style of machine is also increased by the arrangemnt for handling the cars. Instead of the gravity track, a switch runs from the machine track back of the machine. The cars run from switch to the machine track and then a bump car pushes them into the machine. Another addition to speed is made by the use of chain fastenings, and the manner of placing the car in the cradle. When the car has been raised, dumped and re-





VIEWS OF THE PERFECTED MC MYLER CAR DUMPING MACHINE, ON THE DOCKS OF THE VALLEY COAL TRANSFER CO.

turned to the track it runs out of the machine at the opposite end and with the arrangement at this dock it goes to the ore piles and is ready for loading. This apparatus will handle some 30 cars an hour when in completeoperation. The coal strike came on just after it got into good working order, and prevented a full test. It was built by the McMylerMfg. Co., Cleveland, O.

The Kaiser Wilhelm der Grosse and the Campania.

It has been decided that the new high-speed North German Lloyd Atlantic liner Kaiser Wilhelm der Grosse will sail on her maiden voyage to New York on the 15th of September—a date fixed with special reference to the efflux of American tourists from Germany after the season. Meanwhile good progress is being made with the fitting of the engines. No secret is made of the desire to excel the Campania and Lucania, so that some comparative figures are sure to interest engineers. The engines of the German ship are triple-expansion, but with four cylinders arranged on the Schlick-Tweedy-Yarrow system, so as to secure the balancing of all motions. In the Campania there were two 37-in. high-pressure cylinders to each engine; in the German ship there is one 52-in. cylinder; the intermediate cylinders are 79 in. and 89¾ in. respectively, while the two low-pressure cylinders are 98 in. and 96½ in. It will be seen that there is a material difference in the relative volumes of the cylinders. The German ship has nickel steel shafting, and it is interesting to note that each nickel steel crank weighs nearly 40 tons, while in the Campania, where Vickers steel was used, each is only 27 tons. The shafting, made by Krupp, is 198 ft. long, and the propellers, of bronze, are of great size, the diameter being 22 ft. 3¾in., and the pitch 32 ft. 10 in. In both ships the propeller shaft is of 24 in. diameter, so that it would almost appear that the adoption of the nickel steel alloy has not materially decreased the weight, although it must be remembered that the German ship will develop greater power, and, further, a slightly larger hole is bored out in the case of the Krupp shaft. The two condensers of the German ship have a cooling surface of 35,522 square feet. There are in all 68 engines on board, with 124 cylinders — almost as many as in a warship. The German ship's boilers have greater capacity. The Campania has two funnels, 19 ft. diameter and 130 ft. high from the bottom of the ship. The German ship has four, of 12 ft. 2 in. diameter and 106 ft. high from the keel. The crew of the German ship is to number 450; that in the Campania is, under ordinary conditions, 415 all told. The dimensions of the German ship have already been given, but it is not without interest to note that she is 648 ft., the Campania 622 ft., and the new White Star liner Oceanic 705 ft.; that the ratio of beam to load-line length is 1 to 9.6 in the Kaiser Wilhelm der Grosse, 1 to 9.23 in the Campania, and 1 to 10 in the Oceanic, the latter, therefore, being by far the narrower in relation to length. The German ship will carry 400 first, 350 second, and 800 third-class passengers; the Cunarder takes 600 first, 400 second, and about the same number of third. Yet the relative displacement is 20,000 to 18,000 tons, but it is not possible yet to determine whether this means that the German steamer will have more room.—Steamship, Leith, Scotland.

Rapid Steam Shovel Work.

Editor Marine Review:—The figures you gave were correct at the time obtained by you, but since then this Vulcan steam shovel has exceeded that limit and loaded 232 27-ton cars of iron ore in 8 hours and 40 minutes, and 46 cars in one hour and ten minutes. Do you comprehend that 232 cars represent over 6,000 tons, gross? We have just received report for the month of June, which shows about 170,000 gross tons handled. Taking into account time lost in moving, and a shortage of cars, this is wonderful work.

Toledo, O., July 12, 1897. The Vulcan Iron Works Co.

[Continued from page 7.]

6.	Mean pressure referred to L. P. cylinder,	25.3 "
7.	Total Revolutions	26,750.
8.	Revolutions per minute	74.3.
9.	Piston speed in ft. per minute	557.25.
10.	Indicated Horse Power, H. P. Cylinder	400.80.
11.	" " " L. P. "	303.30.
12.	" " " Total,	704.10.
13.	Total coal burned in 6 hrs. 5 min.	8,000 lbs.
14.	Coal burned per hour	1,315 "
15.	" " " I. H. P. per hour	1.867 "
16.	" " " sq. ft. of grate	31.10 "
17.	Steam used as per No. 9 H. P. card	12.64 "
18.	Revolutions of fan engine	195 to 200.
19.	Air pressure at Fan	2.25 inches.
20.	Feed water entering Heater	125 degrees.
21.	" " " Boiler	138 "

"In calculating the horse powers I have deducted the areas of the piston rods from the lower ends of each cylinder and in every other way the test was made rigorously impartial, and the results as shown by the foregoing figures are eminently satisfactory, the stipulated horse power being attained and the coal consumption being well within the limit. In fact, the result obtained from this machinery compares favorably with that from many of the triple expansion engines and no attempt was made to deviate from the ordinary conditions of working, the engines running at their usual gait and the firemen keeping the steam almost steady at 120 lbs., without any unusual exertion on their part. Of course on this vessel there are no auxiliaries, such as electric engine or steering engine to provide steam for."

"During the trial, and all the time we were on the vessel, the engines and pumps worked most smoothly and satisfactorily, with a total absence of any vibration in the hull, and including the boiler and fan, all the parts appear to be carefully and well proportioned. It is to be noted that the boiler tubes have been slightly increased in diameter over former practice and Mr. Calder claims a resulting improvement."

"I would here suggest that the fan should be fitted to draw its supply of air from the engine room, so as to ventilate the latter and avoid the dust and ashes which now goes through it, and must soon accumulate to the detriment of the surface for heating the air going into the furnaces."

"On the 5th between the hours of 3 and 5 p. m. we made a two hour full power trial with the following results:"

1.	Steam pressure	115 to 120 lbs.
2.	Receiver	17 to 19 lbs.
3.	Vacuum	24.5 inches.
4.	H. P. Cylinder, mean pressure 5 sets cards,	67.20 lbs.
5.	L. P. " " " "	15.54 "
6.	Mean pressure referred to L. P. cylinder	30.92 "
7.	Revolutions per minute	80.6.
8.	Ind. Horse Power, H. P. Cylinder	468.0.
9.	" " " L. P. "	473.0.
10.	" " " Total,	941.0.
11.	Total coal burned in 2 hours	3,600 lbs.
12.	Coal burned per I. H. P. per hour	1.92 "
13.	" " " sq. ft. of grate	42.65 "
14.	Air pressure at Fan	3.25 inches.
15.	Feed water entering heater	133 degrees.
16.	" " " boiler	148 "

"This trial was made during the latter half of the watch and yields a remarkably good result."

"On the run from Detour to Ft. Gratiot, the time was 26 hours 56 minutes, giving an average speed of 8.35 miles per hour, and the slip of the propeller as near as I could estimate was 17 per cent."

"The indicator cards herewith are copies of those taken during the 6 hours' trial and are identical in character with those taken in the full power run only, that in the latter, steam was carried further in the H. P. cylinder and produced fuller cards."

"The cards are excellent and show that the valve motion is as near being perfect as possible and I must say that, taking everything into account, I consider this plant in the Kaliyuga to be one of the best and one of the most efficient ever installed on any lake vessel."

Lake Freight Information.

Although rates are practically the same the freight market is in much worse shape than it was a week ago and at some of the ore shipping ports it is impossible to get cargoes. Although quite a few boats were laid up during the week offerings of tonnage are much more liberal than the demand. Shippers from ports at the head of Lake Superior have been out of the market for wild boats for nearly two weeks, and for several days past some of them have been unable to take care of their contract tonnage. The trouble has been caused by the floods in the northwest. The railroads running from the mines to Duluth and Superior have been unable to do much for the past ten days on account of the washouts and nearly all of the open pit mines are flooded. Vessels that arrived at Duluth last week are still waiting for cargoes and much time has been lost by the Lake Superior traders. In a few cases tows were caught without loads and where a cargo was found for the steamer the vessels were left behind. It will take some time to put the mines and railroads in shape again and shipments of ore from Duluth, Superior and Two Harbors for July will show a big falling off compared with June. Most of the small wild boats are being laid up as fast as they get down, and big carriers are being held at this end of the route until down cargoes are found for them. During the past few days there has been a fair demand for tonnage at Chicago and big steamers are being sent light to that port from Lake Erie for grain, at 1 cent on oats and 1¼ cents on corn.

There is no indication of a settlement of the coal miners' strike and very little business will be done in coal freights this month. Vessel men that have no arrangements for fuel are paying fancy prices for coal. The price to outsiders is now $2.25. Wild boats cannot stand that price and it will put a big hole in the earnings of steamers that have the best contracts. The indications are that the market will be very dull the balance of the month, but vessel men are hopeful that after matters get straightened out at the head of Lake Superior and the coal miners' strike is settled that there will be plenty of business and that better rates will be paid all around. Ore carriers are getting better dispatch at the Lake Erie ports than they did last week as cars are more plentiful.

Another Account of the Pewabic Wreck.

The following account of the Pewabic wreck given by a Detroit gentleman is the most interesting of any published. He says:

"The collision occurred about 8 o'clock at night. It was a beautiful night, with scarcely a ripple on the lake. We had seen the Pewabic for over an hour. As the boats drew close together every one was on deck to exchange salutations with the passengers on the Pewabic. The boats came close together, so that papers could be thrown from one to the other. Just as we were close together the Pewabic suddenly cut across our bow and the Meteor crashed into her. The scene that followed cannot be described. Many jumped from one boat to the other. Women became terror-stricken and threw themselves into the lake. We did not know how badly our boat was injured, or whether we were going to the bottom also. Within twenty minutes after the collision there was nothing to be seen of the Pewabic except her hurricane deck, which had floated off. The Meteor began to fill rapidly. Every blanket and mattress on the boat was taken below to patch up holes in her bow. I, with the rest of the passengers, took my turn at the pumps and worked the greater part of the night. The women all had life preservers on and were seated on top of the cabin in case we went down. We lay along side the spot where the Pewabic went down until morning. Word of the disaster had been sent ashore and a tugboat came out and took off the dead bodies and those of the Pewabic's passengers who would venture the run to Port Huron. We made our way slowly to the Soo and arrived there about midnight on the day following. The next morning at daybreak the Meteor burned at her dock. The water had touched some quicklime in her hold and set it afire. We afterwards found out that the boat had been afire for hours, and that the crew had been fighting it almost from the time that we struck the Pewabic. Captain Wilson did not mention the matter to a passenger, but took his chances on reaching his destination in safety."

The mail handled at the Detroit marine postoffice from the beginning of navigation, April 12, to June 30, was 56,607, an increase over the same period last year of 6,272 pieces.

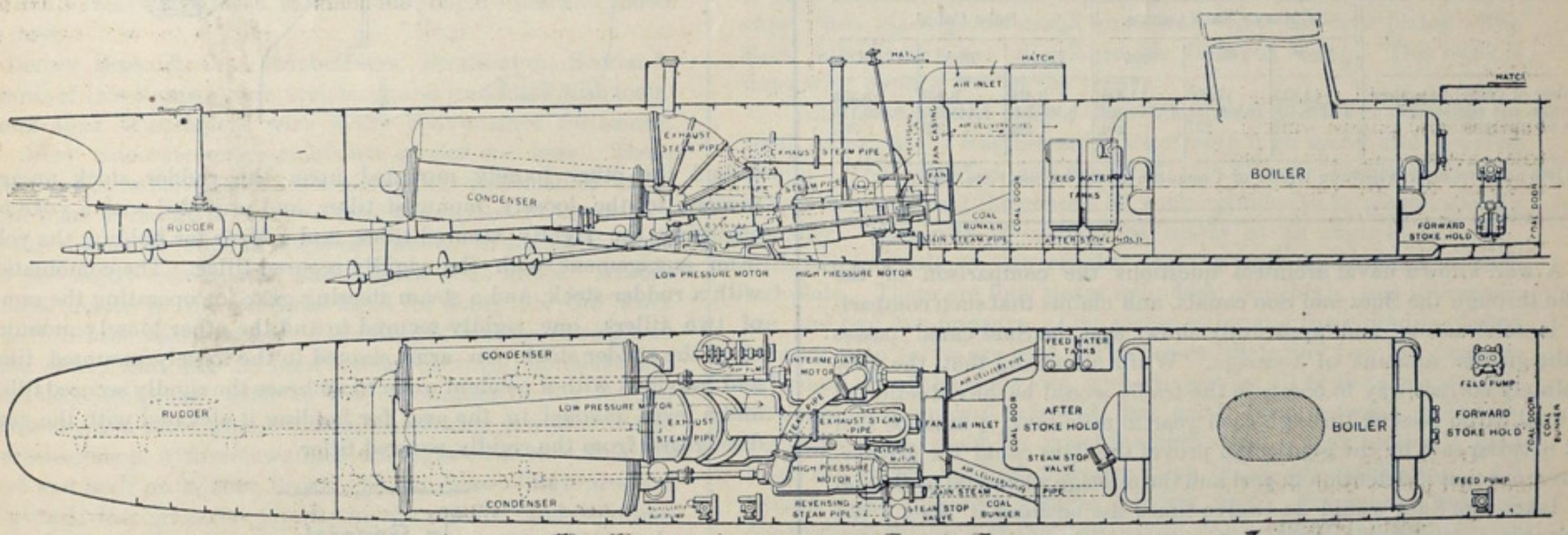
The Coming Marine Engine.

The presence, by request, of the new steamer Turbinia at the naval review of Spithead last week has suggested the prophecy that the lines of battleships she ran through at the time will all be superseded in the next twenty years by vessels with turbine engines. But they possess other qualities besides speed. They are economical and the weight per horse power would recommend them for merchant ships.

Mr. Parsons told the following about his invention in a paper read before the Institute of Civil Engineers on May 26, and he seemed much more certain of the practical application of the steam turbine to marine purposes than he was in his original paper regarding the Turbinia. The consumption of steam on the Turbinia's trials, he said, had not exceeded 14½ pounds per indicated horse power at full load, which is less than with ordinary reciprocating engines. This would enable the size and weight of boilers and the amount of coal carried to be reduced and the high speed of the engines diminishes not only the weight of the engines themselves, per horse power, but also the weight of shafting, propellers, and hull.

"The total weight of machinery in vessels of the torpedo boat destroyer class on the turbine system," says Mr. Parsons, "will probably not exceed one-third that of ordinary engines of the same power."

Although the Turbinia has made a speed of 32¾ knots an hour, or nearly 37¾ miles, Mr. Parsons does not believe she has reached her limit. "It is anticipated," he says, "that after some alterations to the steam pipe still higher speeds will be obtained. In the Turbinia the stresses on the boiler and machinery are, as far as possible, according to Board of Trade rules, and the scantlings of the hull are heavy for a boat of her size and class. It is believed that when boats of 200 feet in length and upward are fitted with compound turbine motors, speeds of 35 to 40 knots may be easily obtained in vessels of the destroyer class, and it is also believed that the turbine will, in a lesser degree, enable higher speeds to be realized in all classes of passenger vessels."



SECTIONAL VIEWS OF THE TORPEDO BOAT TURBINIA FITTED WITH TURBINE ENGINES.

The Turbinia is 100 feet long, 9 feet in beam, 3 feet draught, and of 44½ tons displacement. Her machinery weighs 22 tons. The steam is supplied to the turbines at 170 pounds pressure and expanded until it indicated only one pound pressure to the square inch at the end of the third turbine of the series, and then it is pumped out and condensed. At full speed the turbines and screws make 2,200 revolutions a minute. The steam is supplied from a water tube boiler working under forced pressure, the air being supplied by a fan which works on the inboard end of the low pressure or central screw shaft. This arrangement has the double advantage of utilizing the power from the main engines and also of delivering the air in exact proportion to the steam that is being used and the power generated.

Unclaimed Letters.

Letters for the following persons remain unclaimed at the marine post-office Detroit, Mich.: C. H. Botsford; I. T. Barnes; Chas. Cartwright; J. E. Cark; J. J. Cummings; Chas. A. Cady; Chas. H. Diem; Frank E. Doyle; Allen Drew; W. C. Fitzpatrick; Mrs. Nellie J. Gillespie; John M. Gregory; R. S. Hannat; Daniel B. Haley; Frank Hanky; G. B. Kenyon; Fred Melsch; A. O. McGinnis; Fred MacDonald; Fred W. MacDonald; Jas. F. Powers; Mrs. Cora Peterson; Is. Quackenbush; Joseph C. Ritter; John Symington.

Subterranean Outlet of the Lakes.

The New York Sun has been giving considerable attention to the Great Lakes and recently presented some lake statistics, adding interesting comments. But when it proceeds to discover a subterranean connection between Lake Superior and Lake Ontario it goes too far, or rather not far enough. It ought to locate the Superior entrance to this channel, and open up the way for small steamers to get into the Lake Ontario grain trade without coming down Lake Huron, through the rivers and the canal. It gives the following argument to uphold the claim:

"There is no other theory by which certain mysteries of the great lakes may be explained. The surface of Lake Superior is about 650 feet above tide, while its bed is 260 feet below tide level. Lake Huron's surface is 50 feet below that of Lake Superior, and its bed is about on a level with Superior's bed. The surface of Lake Michigan is 300 feet lower than Lake Huron's, and its bed is sunk to a corresponding distance to the level of Lakes Superior and Huron. Lake Erie's surface is nearly as high as Lake Michigan's, being 565 feet above tide, but its bed is also above tide, being 350 feet above the ocean level, consequently its bed is 250 feet higher than the beds of Lake Michigan, Huron, and Superior. The surface of Lake Ontario is the lowest of all lakes, being less than 500 feet above tide, but its bed is 260 feet below the ocean level, or on about the same level with Lakes Michigan, Huron, and Superior. So there is a continuous fall from Lake Superior to Lake Ontario, and all the known outlet that the upper lakes have is in the comparatively insignificant Detroit river. It does not seem within the bounds of physical possibility that Detroit river could dispose of all that great volume of water from above, or its banks withstand the enormous pressure of that immense volume, and the theory of the existence of the underground river such as I mentioned seems to me not only plausible but the existence of that stream is a necessity. All the St. Lawrence river fishes are found in every one of the great lakes except Lake Erie. Why? Because they follow the course of the subterranean river, passing 300 feet beneath the bottom of Lake Erie, and enter the waters of Lake Michigan thence to be distributed to the other lakes above it."

Correcting a Correspondent's Mistake.

Editor Marine Review:—"In your issue of the 8th, you illustrate on page 8, a bow chock, stating that it was designed by Mr. Ford, which statement I can not permit to pass unchallenged. I think, if you will question Mr. Ford himself, he will admit, that this chock is but an outgrowth of former designs of this kind, used for a number of years on oil barges and still earlier on coal barges on this coast. As to this particular chock, it is in use on the Bessemer Co.'s barges, and the first sketch of it was made by me one evening last spring, 1896, at the Weddell house in your city and sent to Mr. H. G. Dalton for approval."

John Haug.

Philadelphia, Pa., July 10, 1897.

Notice is hereby given that, on July 5, 1897, the characteristics of the light on the red gas buoy, marking Poverty island shoal, about 2½ miles NW. by W. ¼ W. from Poverty island light house, inside the entrance to Green Bay from Lake Michigan, was changed from fixed to flashing white every 10 seconds, without other change.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,792	924,630.51
Sailing vessels and barges	1,125	354,327.60
Canal boats	416	45,109.47
Total	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30. 1891	204	111,856 45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
" " " 1896	117	108,782.38
Total	864	444.216.36

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canals.			Suez Canal.		
	1896*	1895*	1894	1896	1895	1894
Number of vessel passages	18,615	17,956	14,491	3,409	3,434	3,352
Tonnage, net registered	17,219,418	16,806,781	13,110,366	8,560,284	8,448,383	8,039,175
Days of navigation	232	231	234	365	365	365

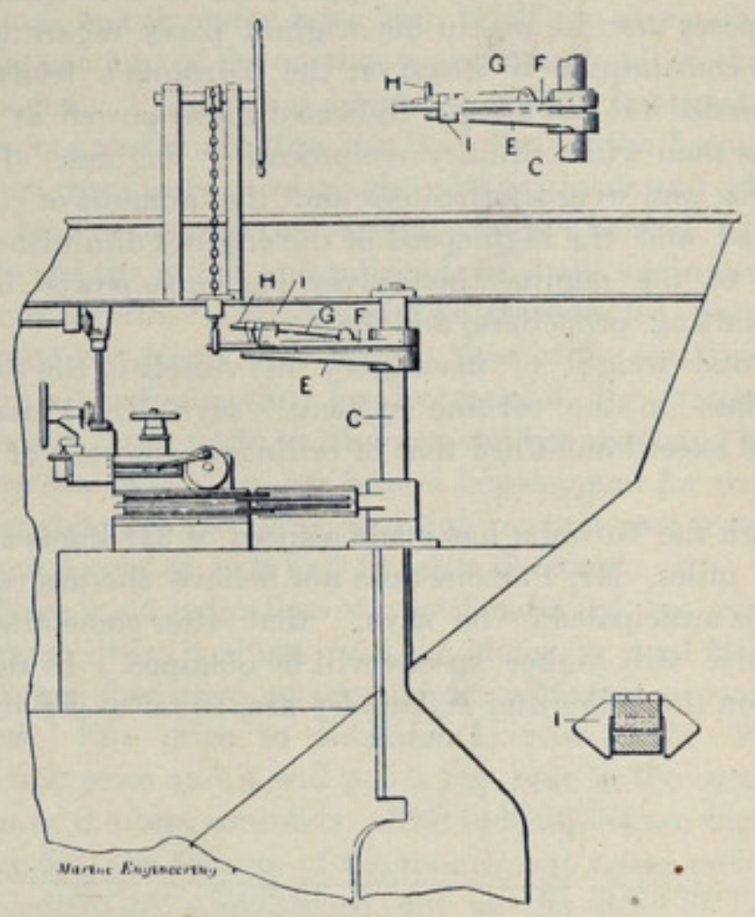
*1895 and 1896 figures include traffic of Canadian canal at Sault Ste. Marie.

A well-known naval architect questions the comparison of the traffic through the Suez and Soo canals, and claims that such comparison is misleading, and apparently shows that the Suez canal passes far the greater amount of tonnage. While admitting that the only absolutely correct way to compare the traffic would be the reduction of the total cargo passing through each year to mile-tons, it must be said that nothing said by the gentleman proves the Suez canal the greater. He reasons that if detention in port and the mileage was equal to that on the lakes the Suez would do twelve times the business it does. We think his patriotism has led him to make an extravagant claim. On the lakes the amount of tonnage passing the Soo canal depends on the production of ore, grain and other commodities. He makes an assumption, and then multiplies by the assumption, and makes some imposing figures. The Soo canal figures are actual. And if the route of lake vessels passing the Soo was as long as the routes of those passing the Suez canal, we would have more steamers. It may be that there is no fair means of comparing the amount of traffic through the Suez and Soo canals, but the Review will continue to give the comparisons until better reasons than those given are forthcoming.

An English exchange says that last year the United States carried only twelve per cent. of the total exports and imports of that country. So that, after a hundred years of national life, the United States are doing less than half the percentage of the shipping trade that was done by the thirteen British colonies prior to 1795. Meanwhile Great Britain, Germany, France and Italy have been steadily increasing their carrying trade. Of course England, France, Germany and Italy have been increasing their shipping, but the people have been paying for it in subsidies. This year the Campania and Lucania, Majestic and Teutonic will receive some $35,000 each. The P. & O. company will receive about half as much for each of four steamers, and the Canadian Pacific gets $100,000 for their three steamers. The armament kept in readiness for such ships in England, in India, and in Hong Kong or Esquimault, consists of breech-loaders in place of the previous muzzle-loaders. In the event of war breaking out each ship is to be supplied with twenty-six seamen gunners from the naval depots, in addition to a full complement of men from the Royal Naval Reserve.

A Patent Steering Gear.

Frank E. Kirby of Detroit, Mich., has patented a steering gear. The combination is with a rudder stock and a steam steering gear adapted to operate the same, of a tiller secured to the stock, a tiller loosely sleeved on the stock, a locking device on the loose tiller adapted to automatically connect the two tillers together, means for holding and locking the device out of engagement, and a hand steering gear connected with the loose tiller. The combination with a rudder stock and steam steering gear, of two tillers, one rigidly secured



to and the other loosely mounted upon the rudder stock, an arm pivoted to the loosely mounted tiller, and provided with a yoke for engaging the rigidly secured tiller, and a lever for holding the yoke from engagement with the rigidly secured tiller. The combination with a rudder stock, and a steam steering gear for operating the same, of two tillers, one rigidly secured to and the other loosely mounted upon the rudder stock, an arm pivoted to the loosely mounted tiller and provided with a pendent yoke to embrace the rigidly secured tiller, and a lever pivoted to the arm for holding it elevated with the yoke disengaged from the rigidly secured tiller.

In General.

The Navy Department will expend during the next few months more than $500,000 in dredging operations at the various navy yards. The most extensive work will be at League Island, Mare Island and Port Royal, but about $60,000 will be expended on improvements to the entrances to the docks at New York, Washington and Norfolk.

One of the largest steam tugs on the great lakes is now under construction at the Bell Steam Engine Works, Buffalo. The boiler for this tug is to be furnished by Thomas Kingsford, Oswego, N. Y. This boiler is to be of the flat crown sheet type with double furnaces and single combustion chamber, each furnace 5 ft. by 6 ft. 6 in. long. Each furnace is to have four main fire flues 17 in. diameter. Boiler will contain 196 tubes, 3¼ in. diameter by 12 ft. 4 in. long. Diameter of shell 12 ft. Length of boiler 16 ft. Steam drum 48 in. diameter by 8 ft. long. Height of boiler to top of shell 13 ft. 7 in. Boiler to be built for a working pressure of 150 lbs.

Under the new regulations for measuring boats the following instructions have been received at the custom house. The carrying capacity of boats shall be determined by the following rule: Multiply the outside length, outside width and inside depth together, and the product by six-tenths. The quotient will be net cubic feet contents. Divide the product by seven for river steamers, and for ocean, lake, bay or sound steamers divide the product by ten. This will give the number of persons such boat will be allowed to carry. Example —The carrying capacity of a boat twenty feet in length, five feet in breadth and three feet in depth will be determined as follows for river steamers: 20x5x3x6-7=180-7=25 persons. For ocean, lake, bay or sound steamers, same dimensions, 180-10=18 persons.

British Ship and Engine Construction.

Walter Miller, the well-known mechanical engineer of the lakes, when abroad several years ago, took notes of important items of construction in British ship yards. Recently he read a paper before the Engineers' Club of Cleveland, giving the results of these notes. Those concerning the larger yards are given below, as copied from Marine Engineering:

J. & G. Thompson Co., Lim., Clydebank, Glasgow. These works are very large and shops modern; completed with overhead cranes and new tools. Large vertical planers, horizontal drilling and boring machines. The engines are erected in pits. Large government contracts on hand. In the boiler shops on all the inside work on the Scotch boiler, the riveting is driven countersunk; the heads of the rivets are nearly flush. Front and back head flanges turned in; the last head riveted by hand. The rivet holes are countersunk, the rivets driven full and finished by a set. Vertical rolls are used for rolling the boiler shells.

The Fairfield Ship and Engine Co., Lim., Govan, near Glasgow. These works are very large; the general plan of the shops is a series of bays, and each bay is served with one and two overhead cranes. All of the shops are complete with new and modern tools. In the machine shops large vertical planers, horizontal drilling and boring machines are used extensively. Boiler shops have vertical rolls and large horizontal drilling machines for drilling, tapping and screwing in of stay-bolts. Tops of cylinder heads are finished, false covers of rolled steel plates cut on band saws to fit heads and chest covers. All of the larger engines are erected in pits. The cylinders are fitted with liners and a false valve faced. Double and triple slides and piston valves are used.

Wm. Denny Bros. & Co., Shipbuilders, Dumbarton, Scotland. The ship yards of this company are very large and well fitted with tools. Experimental tank is complete with every convenience for testing models. Very elaborate experiments are carried out here. These people attach great importance to the use of the experimental tank, as it enabled them to design a vessel to have a speed of 21 knots to a certainty; this was an advance in speed of 6 knots. The fastest vessel they have previously constructed had a speed of 15 knots. All the different departments in the yard are fitted for doing all the work necessary to finish the vessel entire. Seasoning of lumber, sawing and dressing the same, finishing of hard woods, carvings, upholstering, painting and decorating, etc., even to the decorations on the stained glass used for sky and side lights. The machine shop is well arranged with new erecting shop, with side walls of white glazed brick. Engines are designed and built on Walter Brock's patent plan; high-pressure cylinder forward; low-pressure cylinder in the middle, and intermediate-pressure cylinder aft. Valve chest facing port side. Cylinders bolted together with receiver spaces on same side. Valve gear combination of single eccentric and crosshead, with levers and curved links pivoted on back of condenser. Eccentrics connected to one end of the curved link, which has a throw equal to the extreme travel of the valves, and lap and lead being obtained by a combination of lever fulcrumed on radius rod at one end and connected to crosshead at the other. Crank shafts are built up in the usual way and are coupled by taper bolts with round heads. The bolts are fitted with brass washers under heads of bolts. Have to forge all bolts and nuts. The boiler shops are open on the front side, fitted with overhead cranes. Heating furnace has floor plates in front of furnace served with small steam hammer mounted on gib crane, for straightening out plates and flange work. They do not bore out the furnace mouths on the front heads of the boilers. All of the flanges are trimmed off on the plate planers.

Harland & Wolff, Belfast, Ireland, have the largest and most complete works of the kind in the United Kingdom. Ship yard, engine and boiler plant equipped with most modern tools. Boiler work good. All of the tapping and screwing in of the stay bolts is done by large, horizontal drilling machines, the boilers being brought up and lined in front of the machines. Flush riveting is done on all inside work and on the front head in way of the breachings and around furnace mouths. All holes drilled, flanges planed, screw stays full size of bar, plain tubes not beaded over, and nuts on stay tubes. All of the flanges on the boiler heads are turned inward. The back head rivets are driven by hand. All rivets driven by hand are countersunk. Cylinders all have liners and false valve faces. Piston valves are used on high-pressure cylinders only. Excepting in small sizes the cylinders are cast separate. The eccentric yokes are of wrought iron, finished and lined with white metal. Crank shafts are built up in separate parts in the usual way.

Messrs. Maudsley, Sons & Field's (Lambeth, London) shops are old but famous. For many years they have been large contractors for engines and boilers for the British Navy. Machinery that is built for the navy is usually of their own design. This company manufactures the Belleville boiler. The work done on these Belleville boilers is quite similar to what was done on the Belleville boilers of the steamers North West and North Land, excepting that the tubes are larger in diameter, and the elements are longer and higher, thus making each boiler of greater power than those built here. The Belleville boilers, made at these works for the navy, have the ends of the tubes upset before the thread is cut, so that the tubes have their full section after the threads are cut. All of the castings are of steel, including the heads of the steam separator, mud collector, and feed water regulator. The return tubes are used on each of these boilers, which improves the circulation very much. Had some very fine examples of marine engines in hand. Cylinders fitted with liners and steam jacketed. Piston valves on high-pressure cylinder, double ported slide, balance valves on the intermediate and low-pressure cylinders. As designed, each engine is separate and the cylinders are supported on four cast iron columns, which form the guides as well. Each pair of columns are connected athwartships below the guide by a wrought iron girt. Tie rods connect cylinders about half-way up. Engines of this design take up more room, fore and aft, than usual, but gives ample room below, and it makes them very accessible and easy to get at. The engine room floor plates are level with the journal caps, thus placing the crank shaft well below the floor plates. The stern tube bushes are all planed for the wood filling. This work is done with a round bar on the planer.

John Thornycroft & Co., Chiswick, London. Plant designed for small work only. Engines are built of very high speed and peculiar design. The cylinders are arranged at an angle overlapping each other, thus enabling the centers of each cylinder to be placed closely together. Each pair of cranks are nearly at an angle of 180 deg., with two journals to two cranks, making only six bearings in each bed plate. There are four steam cylinders; one high, one intermediate, and two low-pressure. One piston valve and three double ported balance slide valves are used. The intermediate and two low-pressure cylinders are of the same size, with the pistons all of the same weight. The engines are nicely balanced, but small ratio between cylinders. Economy not so much an object as a high speed. Link motion is fitted to all the valves, the high-pressure valve being adjustable only. All around steam and hand reverse gearing used. The exhaust is taken out through the back of the slide valves, thus simplifying the cylinder castings.

"Don't be nervous; there'd be fifty jackies over the side after the youngster before he'd have time to strike the water." So said a naval officer once in my hearing to the anxious mother of two little chaps who, visiting one of our men-of-war in the harbor, had gone for'ard among the crew in company with half a score of kindly, big-hearted blue-jackets. And what he said—allowing for some sailor-like picturesqueness of language—was largely true, for when did one ever hear of man-o'-war's man—at least of those that speak English—failing to take any risk, short of absolute impossibilities, to save life, or to go to the rescue of those in peril and distress on the "mighty deep." I think it is in one of Clark Russell's stories that the hero, storm-tossed on sinking wreck, breathes forth a prayer that the sail he has just sighted may fly English or American colors, confident of rescue at all hazards at sturdy Saxon hands. On the Trenton, dragging, with colors flying, slowly to destruction on the wind-torn waters of Samoa Bay, generous hearts yet found means of rescuing comrades from the masts of the already submerged Vandalia. Only the other day the telegraph flashed from far-off China curt news of the foundering of a steamship with its load of passengers, and the prompt response of the crews of our warships near by to the cry for help. Over and over again the heroic story has been told, and it will be told again and again as long as men "go down to the sea in ships."—Harper's Weekly.

Ask agents about dates the one fare rate to Chicago will apply via the Nickel Plate road account unveiling of Logan's Monument July 22nd. 186-21

Around the Lakes.

Six thousand pounds of copper has been recovered from the Pewabic wreck to date.

The Youghiogheny, New York & Lehigh Coal Company's West Superior dock, with 8,000 tons of hard coal, burned, the loss being $58,000.

The Chicago coal docks are very well off for fuel. O. S. Richardson says that his supply would be sufficient to fuel his customers for a month to come.

The Big Four railway has established a car ferry service between Benton Harbor and Manitowoc. The first run was made by a tug and two ferries, which is all that will be used at present.

Owners of the steamer Cormorant answer a suit for salvage by the White Line Duluth, by saying that although the steamers engines were disabled she was not in danger. They agree to pay towing charges.

Capt. and Mrs. Persons of Thunder Bay island, and Mr. and Mrs. Case of Alpena, went down to the Pewabic wreck in the Smith diving bell, remaining an hour and a half. These are probably the only women who ever went down in 160 feet of water and came up alive.

Major Symons has made a report to the chief of engineers of the army on the preliminary examination into the subject of a ship canal from the lakes to the navigable waters of the Hudson river. The report will not be made public until it is submitted to congress.

Capt. Thomas Pringle, who died at Marine City last week, began the life of a sailor at sixteen years of age and served on vessels of different capacities until he finally became master and owner of several of the largest lake schooners He assisted in the difficult work of taking the steamer Sam Ward over land to Lake Superior.

The Baltimore & Ohio Railway Company will have no financial interest in the proposed Detroit-Sandusky ferry company. At Detroit and Windsor the ferry line will connect with the Grand Trunk railroad, and through that line with the Wabash, the Detroit, Lansing & Northern, the Flint & Pere Marquette and other railroads leading from Detroit and Windsor.

The schooner Starke built and owned in Milwaukee until sold to Capt. Archer of Louisiana, made quite an impression in Baltimore recently where she loaded 500 tons of coal for Galveston. Owners of small schooners on the lakes would do well to look into this gulf trade. It is not long since that an Alabama railroad official wanted to buy some barges to carry coal to Mexican ports.

The Maritana took a party of gentlemen interested in Pennsylvania furnaces up to Duluth to look over the mines of the Minnesota Iron Co. Albert Broden of the Reading Iron Co., Edward Cook of the Warwick Iron Co., R. P. Hecksher, E. T. Clymer and ten-year old Heister Muehlenberg, owning several Pennsylvania furnaces made up the party which was entertained by W. M. McLachlan of Pickands, Mather & Co.

Lieut. Commander J. M. Hawley, U. S. N., with a surgeon and a boatswain, will start from Washington next week on a tour of lake cities with a view to securing recruits. The first stop will be made at Duluth, and then Chicago, Milwaukee, Toledo and Buffalo and other lake cities will be visited. The terms offered are: For ordinary seamen $19 a month, and for sailors $24, with an allowance of $1 a month extra to each upon re enlistment, and rations. The recruiting officer also hopes to secure some machinists from the lake ports for the navy. The pay of these men in the navy is to be $70 a month against an average of $45 on the lakes.

U. S. ENGINEER OFFICE, Duluth, Minn., July 10, 1897.—Sealed proposals for building two breakwater piers, each some 2700 feet long, at Lake Superior entrance to Portage Lake Ship Canals, Mich., will be received here until noon, Sept. 10, 1897, and then publicly opened. Information furnished on application. CLINTON B. SEARS, Major Engrs. Sept. 3.

OFFICE OF THE LIGHT-HOUSE BOARD, Washington, D. C., June 29, 1897. Sealed proposals will be received at this office until noon on Saturday, the 31st day of July, 1897, for furnishing the materials and labor of all kinds necessary for rebuilding and repairing the light-house tender Holly. The repairs to said vessel must be completed and the vessel delivered within six calendar months from date of the approval of the contract by the Secretary of the Treasury, and bidders are informed that because of the urgent need of the speedy delivery, the element of time to be consumed in repairing and rebuilding the vessel will be given large consideration in determining the award of the contract, and the contract will be awarded to the lowest best responsible bidder. Each proposal must be accompanied with a certified check payable to the order of the Secretary of the Treasury, in the sum of one thousand dollars ($1,000). The certified check of the successful bidder will be retained until the execution of a formal bond or contract, and the approval of the same by the Secretary of the Treasury, and the certified checks of the unsuccessful bidders will be returned immediately after the proposal of the successful bidder has been accepted.

Forms of proposal, plans and specifications showing what is required, can be had or seen by applying to this Office.

The right is reserved to reject any or all bids and to waive any defects. W. S. SCHLEY, Captain, U. S. N., Chairman.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

Chas. E. & W. F. Peck,

58 William St.
NEW YORK CITY.

812 Royal Insurance Building.
CHICAGO, ILL.

C. T. BOWRING & CO.,
5 & 6 Billiter Ave., E. C.
LONDON, ENG.

INSURANCE.

BROWN & CO.,
202 Main St.,
Buffalo, N. Y.

J. G. KEITH & CO.,
138 Rialto Bldg.,
Chicago, Ill.

LA SALLE & CO.,
Board of Trade Bldg.,
Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the great lakes, both CARGOES and HULLS.

"GREAT LAKES REGISTER."

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.

FOR SALE.

Marine Engine Patterns. Modern type with working drawings. 3x5 simple, 5x7 simple, 8–18x12 compound, 10–20x12 compound, 4½–7–11x8 triple expansion, 6–10–16x10 triple expansion, 10–16–25x15 triple expansion. Can be had at a bargain. Would like an offer for them.

C. C. WORMER MACHINERY CO.,
55-59 Woodbridge St., W, Detroit, Mich.

WANTED

To lease, purchase or secure, a passenger boat to make an excursion run for whole season. Must be a good boat, well fitted for that purpose, not over 200 feet keel and must not draw more than seven feet water loaded, and five feet would be better. Should be able to develop speed of twelve miles per hour. **Address MARINE REVIEW, Cleveland, O.**

Newport News Shipbuilding & Dry Dock COMPANY.

WORKS AT NEWPORT NEWS, VA.
(On Hampton Roads.)

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long, drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

SHIP AND ENGINE BUILDERS.

For estimates and further particulars, address

C. B. ORCUTT, Pres't,
No. 1 Broadway. New York.

WANTED

Party to furnish material for a steel hull from 55 to 60 feet long by 12 feet beam, and go in partnership with party who owns a suitable engine for same.

GEO. WOLF,
132 West River St., City.

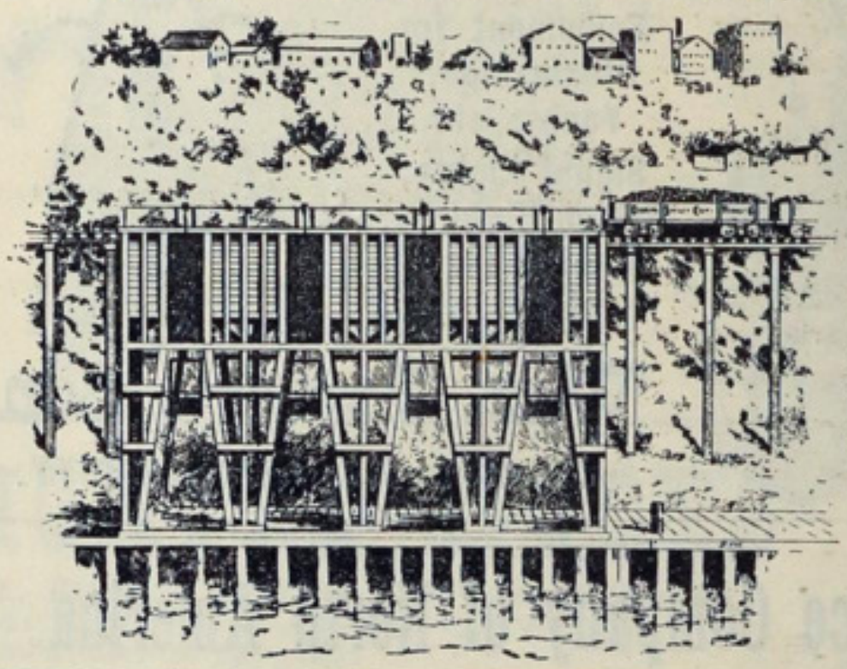
ADVERTISING RATES ON APPLICATION.
COPY OF BOOK AND NAME IN DIRECTORY $5.
BLUE BOOK OF
AMERICAN SHIPPING
409 PERRY-PAYNE BLDG. CLEVELAND, O. U.S.A.
CONTAINING PARTICULARS OF ALL THE PRINCIPAL COAST AND LAKE STEAM AND SAIL VESSELS
A DIRECTORY OF SHIP AND ENGINE BUILDERS AND THE MARINE BUSINESS OF THE UNITED STATES.
FOR CIRCULARIZING - ★ LIST OF 1000 NAMES AND ADDRESSES, COVERING THE PRINCIPAL SHIP OWNERS AND BUILDERS OF THE UNITED STATES
3000 NAMES OF CAPTAINS
4000 NAMES OF ENGINEERS
ON FILE IN THE PRINCIPAL MARINE ORGANIZATION HEADQUARTERS OF THE WORLD.
HANDSOMELY ILLUSTRATED.
USED BY SHIP BUILDERS AND OWNERS FOR GETTING PRICES ON MATERIAL AND SUPPLIES
BLUE BOOK
THE ONLY BOOK OF THE KIND PUBLISHED IN THE U.S.

PUBLISHED JULY 15.

Now ready for delivery to Purchasers.

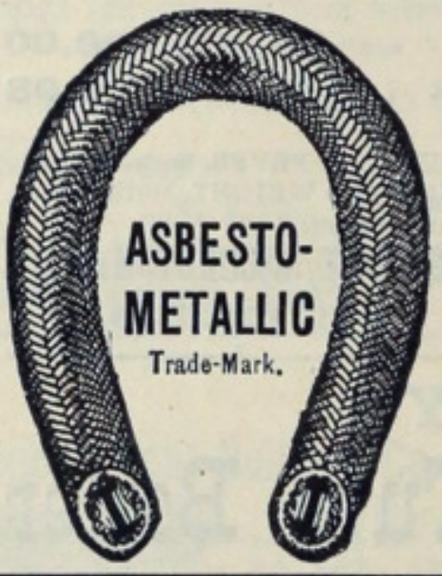
FUEL DOCKS OF OSBORNE, SAEGER & CO.

Cuyahoga River, just above Superior St. Viaduct, Cleveland, O.



Best Youghiogheny Steam Coal Furnished Day or Night. No delay as Elevated Pockets are used.

Telephone 1106.



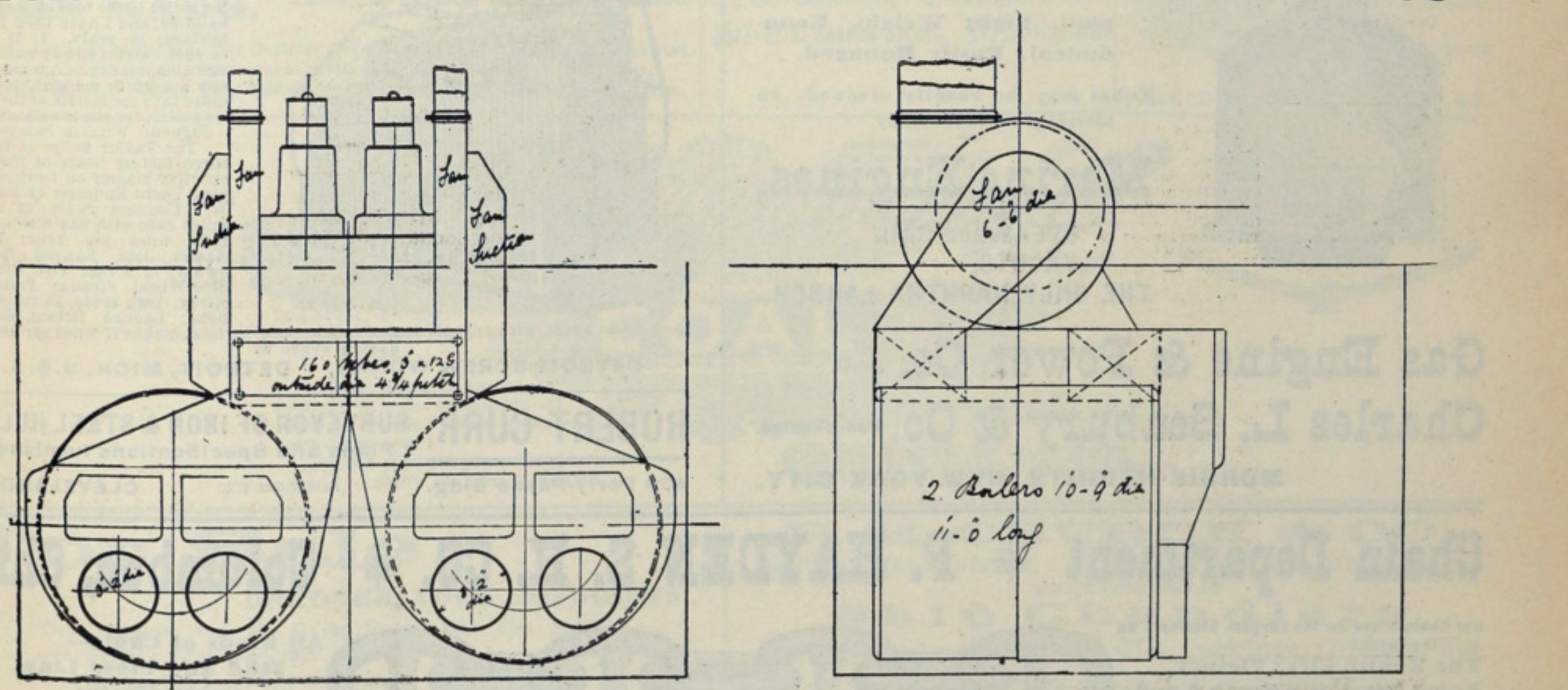
Lucky is the Engineer Who Uses

ASBESTO-METALLIC PACKING

It is in use on more lake steamers than any other, because it meets the requirements.

AMERICAN STEAM PACKING CO.,
Original Manufacturers of
PISTON PACKINGS,
60 Federal St., BOSTON, MASS.

The Ellis & Eaves Induced Draft---Serve Ribbed Tubes



DRAWING SHOWING PLAN FOR ADDING THE ELLIS & EAVES DRAFT TO LAKE STEAMERS.

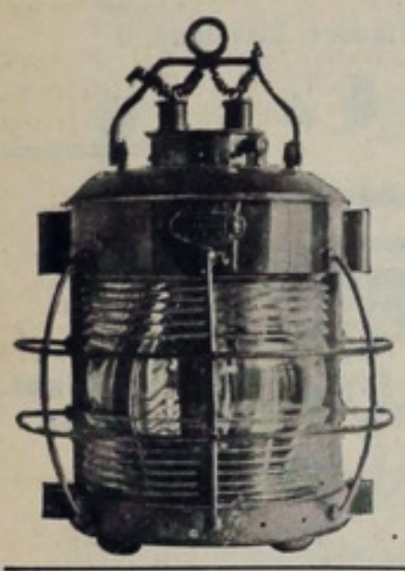
THIS SYSTEM OF DRAFT, WITH THE SERVE TUBES, SAVES MONEY.

S A V E S	25 Per Cent. of Your Fuel Bills.
A $ $ $ A	40 to 50 Per Cent. Boiler Capacity.
V $ $ $ V	The Life of the Boiler by Drawing Gases through Tubes.
E $ $ $ E	Firemen and Incidentally their Wages.
S A V E S	Cargo Space by Using a Smaller Number of Boilers.

For PARTICULARS and PRICES of applying to Steamers already Built and to Steamers Building, apply to

THE GLOBE IRON WORKS COMPANY, CLEVELAND, OHIO.

MARINE LAMPS



Oil and Electric Equipment for Steamships, Yachts, etc.

Signal Lights, Saloon Fixtures, Cabin Lamps, Lanterns, etc.

Wm. Porter's Sons,

271 Pearl St., NEW YORK CITY.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - $3,000,000.00
ASSETS, . - - - - - - - - 9,686,808.08

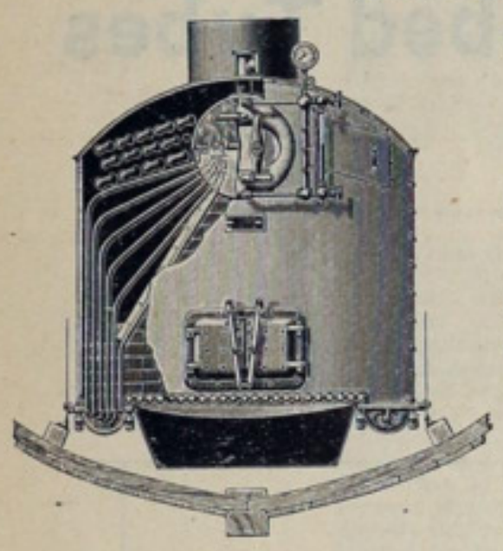
CHARLES PLATT, President. GREVILLE E. FRYER, Sec'y. & Treas.
EUGENE L. ELLISON, Vice-President. T. HOWARD WRIGHT, Marine Sec'y.
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department.

GEORGE L. McCURDY, Manager.
CHICAGO, ILLS.

SEABURY'S
Safety Water Tube Boiler

For all types of Steam Vessels and Stationary Plants.



Reliable, Safe, Durable, Compact, Light Weight, Economical, Easily Managed.

Tubes may be readily cleaned, internally or externally.

Marine Engines,

STEAM and SAIL YACHTS,
THE ONLY NAPHTHA LAUNCH.

Gas Engine & Power Co. and Charles L. Seabury & Co. Consolidated.

MORRIS HEIGHTS, NEW YORK CITY.

G. H. FOSTER, Prest. MARK H. HANLON, V.-Prest. & Secy. W. H. WARNER, Treas.
DAVID BARNHISEL, Gen'l Mgr.

The Inter-Ocean Coal & Coke Co.

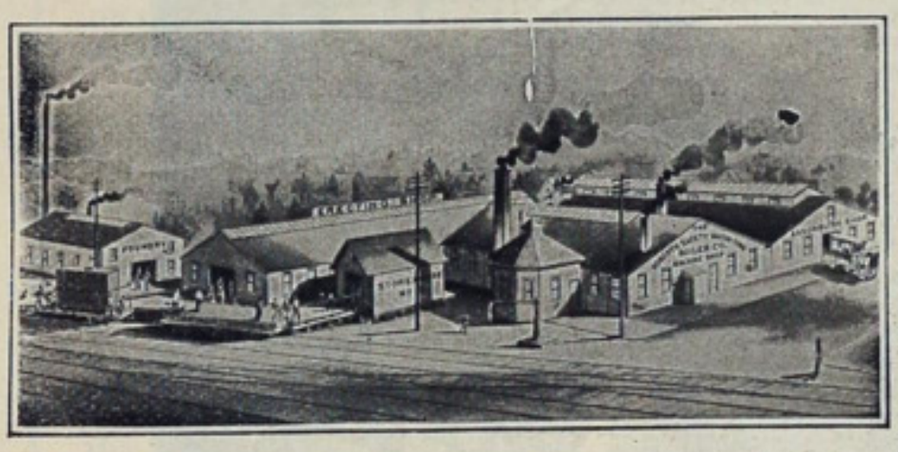
General office, 513 Perry-Payne Bldg., Cleveland.

PRODUCERS AND SHIPPERS.

Choicest Grades of YIOUGHIOGHENY COAL
FOR STEAMBOAT FUEL.

Lighter in Cleveland Harbor of 400 tons capacity.

CLEVELAND DOCKS, just north of Main Street bridge.
SAULT RIVER DOCK at Sault Ste Marie, ¼ mile below the locks.



Office of
AMERICAN STEEL BARGE Co.

West Superior Wis.,
Oct. 31, 1895.

The Roberts Safety Water-Tube Boiler Co., 39 and 41 Cortlandt St., New York.

Gentlemen: Replying to yours of the 28th I am glad to say that the boiler you furnished us for tug "ISLAY" is giving entire satisfaction. I have heard no complaint about it whatever, but have heard a good deal in its favor. I ride on the boat frequently and must say that I am much pleased with its work. Very Truly yours, Alexander McDougall, General Manager.

THE ROBERTS BOILER is the Cheapest, Best and Lasts Longest.

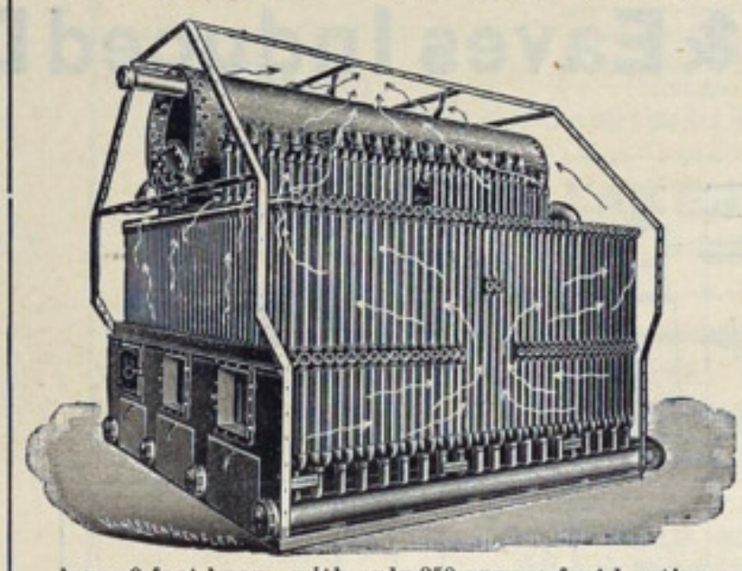
Adapted for use in Yachts, Launches, and Vessels of all Kinds.

Handsome Illustrated Circular sent free on application to

The Roberts Safety Water Tube Boiler Co.,

WORKS, RED BANK, N. J. 39 & 41 Cortlandt St., NEW YORK.

TAYLOR PATENT UPRIGHT WATER TUBE BOILER.



Chief Engineer Skelton of Steam Yacht Enquirer writes: "I can honestly say, that the Taylor boiler is the best boiler I ever handled, and I have been in the business 18 years. It is light on fuel, carries steady water line and steam is dry. You can refer any person to me wishing to inquire into the merits of the Taylor boilor, for she is a dandy."
(Signed) WILLIAM SKELTON, Jr.

The Taylor boiler is in the three fastest boats of their respective classes on fresh water, viz., Yacht Enquirer of Buffalo, W. J. Connors owner; in a 29½ miles race with Say When made 18.78 miles per hour; Yacht Azalia, late Edward Henkel owner, in a race with the fast Side-Wheel Steamer Frank E. Kirby, 1896, made 18 miles per hour; Launch Dream, 63 feet long, 9 feet beam, with only 350 square feet heating surface, makes 17 miles per hour.

MANUFACTURED BY
DETROIT SCREW WORKS, DETROIT, MICH, U.S.A.

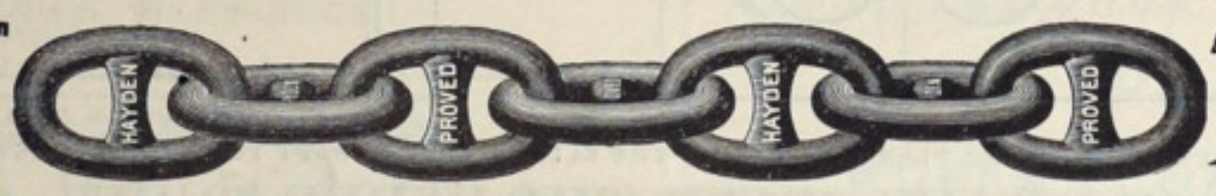
ROBERT CURR, SURVEYOR OF IRON & STEEL HULLS,

Plans and Specifications furnished.

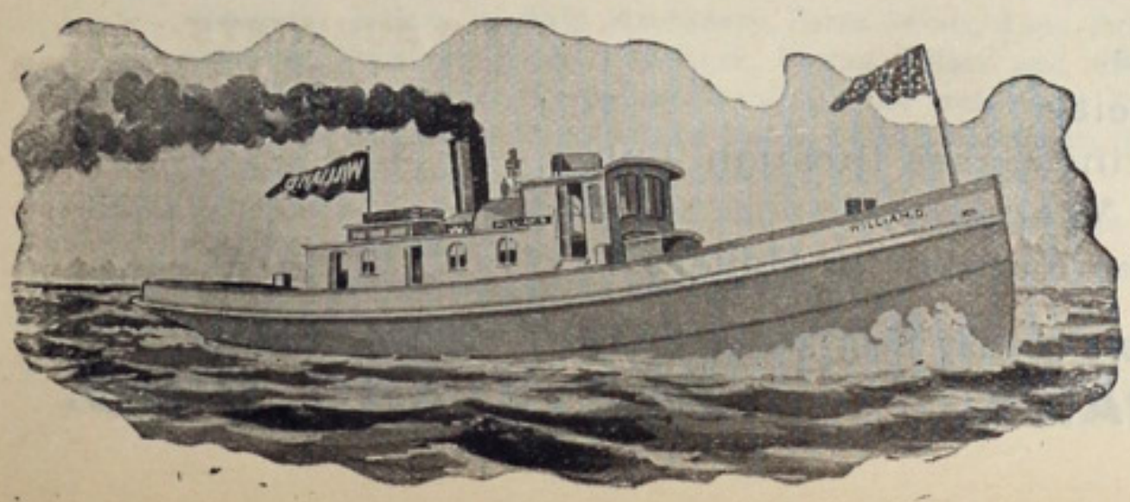
409 Perry-Payne Bldg. Telephone 472. CLEVELAND, O.

Chain Department ✻ P. HAYDEN S. H. CO. ✻ Columbus, Ohio.

Our Chain in use on the Largest Steamers on the Lakes:
The Zenith City, Victory, North West and North Land, and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.



C. E. GROVER, Prest.
D. R. HANNA, V. Prest.

W. A. COLLIER, Sec. & Treas.
CAPT. PHILIP SHIED, Marine Supt

The Ashtabula Tug Co.

Incorporated.
W. A. COLLIER, Gen. Mgr.

MAIN ST. BRIDGE,
CLEVELAND, O.

CLEVELAND, Tel. 409. ASHTABULA, Tel. 149.

CHICAGO.

BARRY BROS.

Independent Tug Line.

TUGS

Rita McDonald, Crawford, C. M. Charnley, D. P. Hall, Ira O. Smith, Wm. Dickinson, W. H. Wolf, Welcome, Commodore, Jack Barry.

Office, 240 South Water Street,

Telephone Main 273.

3 long whistles call our tugs.

DULUTH.

BARRY

Towing & Wrecking Co.

TUGS.

G. A. Tomlinson.

Industry,

Violet H. Raber,

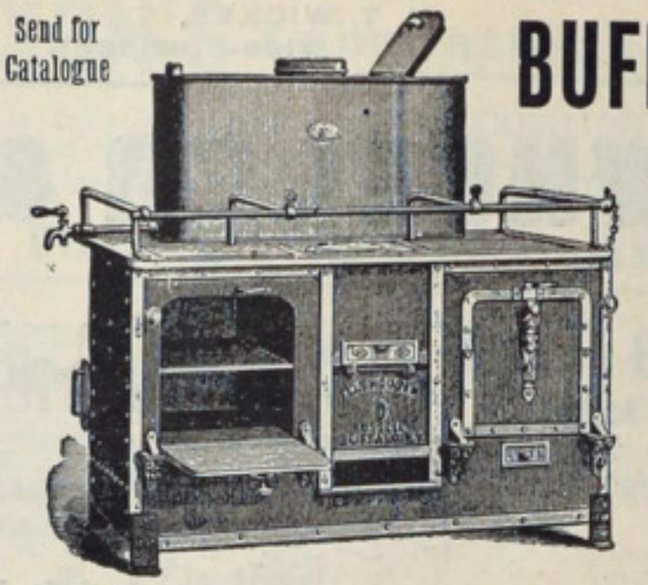
Prodigy.

Office, foot of 5th Ave., West.

Telephone 544.

3 long whistles call our tugs.

Send for Catalogue



BUFFALO WROUGHT STEEL RANGES

Steamboat and Vessel Ranges and Boilers, with patent Rotary Grate.

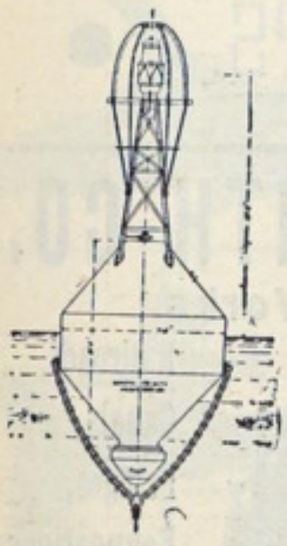
SOMETHING NEW AND GOOD.

We also carry the STAMFORD TUG AND YACHT GALLEY STOVES.

RUSSELL & WATSON

Successors to Felthousen & Russell.

145 Main St., BUFFALO, N. Y.



PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 500 gas buoys and gas beacons in service.

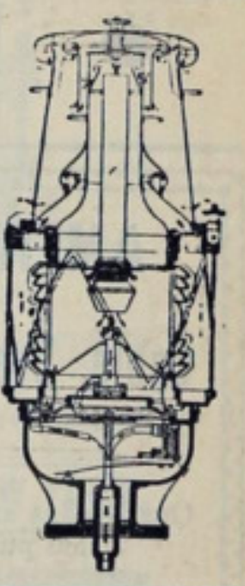
BURN CONTINUOUSLY from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and Steady Illumination. Economical and Reliable in Operation.

CONTROLLED BY THE

Safety Car Heating & Lighting Company,

160 BROADWAY, NEW YORK CITY.



WILLIAM WILFORD'S MATCHLESS WATERPROOF CLOTH Trade Mark.

WM. WILFORD'S

Matchless Water-Proof Canvas.

The best in the market for Hatch Covers, is stronger lighter and more durable than any Water-Proof Goods yet produced. It is made of a twisted thread of pure flax which renders it very strong. It will not crack like Cotton Goods or take fire as easily, which is a great advantage, if soft coal is used.

EDWARD A. BUNKER,

Room 617, 27 & 29 WILLIAM ST., NEW YORK.

JOHN HAUG, Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their Machinery.
specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut Place, Philadelphia.

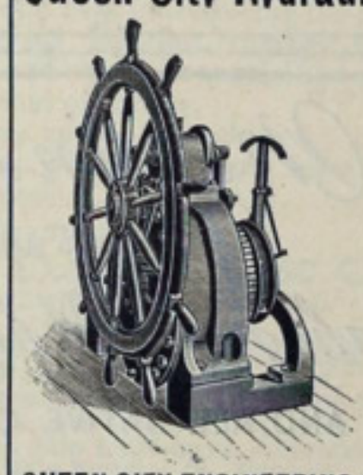
American Boat Building Co. Incorporated.

35x7 foot Launch Frame.

Knock-Down Boats, something new. We do the work, you nail together. Freight low, prices reasonable. Also completed Boats, Half-Raters. Knock-Abouts and Canoes. Send stamp for catalogue.

3517-21 S. Second Street, ST. LOUIS, MO.

Queen City Hydraulic Steerer.



Best and Most Powerful Steerer

FOR TUGS, STEAMERS, ETC.

Price—From $650 to $750, according to size and location in steamer.

Manufactured by

QUEEN CITY ENGINEERING CO., Buffalo, N.Y.

C. S. Richardson Fueling Co.

FUELING DOCKS:
NORTH PIER,
18TH STREET BRIDGE,
ILLINOIS CENTRAL SLIP "C."

COAL

STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE. DIVISION ST. BRIDGE, (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE, (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.

OFFICE,
225 DEARBORN ST.
CHICAGO.

For Sale:

DREDGES, TUGS and SCOWS.

Two Dredges and six Dump Scows, one Flat Scow, one Derrick Scow and four Tugs—

One with 15 by 17 engine, allowed 110 lbs. steam.
" " 17 by 16 " " 110 " "
" " 20 by 22 " " 125 " "
" " 20 by 24 " " 110 " "

Inquiries from parties who mean business cheerfully answered.

JAMES ROONEY, 1118 Collingwood Av., Toledo, O.

J. H. PARSONS CHEMICAL CO. TRADE A·B·C MARK CHICAGO, ILL.

ALKALI WATER PURIFIER!

A Pure Chemical for the safe Removal and Prevention of Scale in Steam Boilers. In use by many of the larger steamship lines on the great Lakes. Guaranteed.

MANUFACTURED BY

THE J. H. PARSONS CHEMICAL CO.,

1509 Masonic Temple, CHICAGO, ILL.

P. M. CHURCH & CO.,

SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH

LEADING DEALERS IN

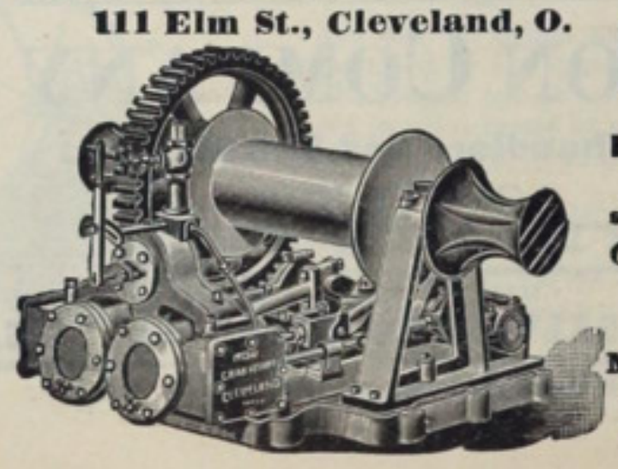
Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc.

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

The Chase Machine Co.

111 Elm St., Cleveland, O.



MACHINISTS and ENGINEERS

MANUFACTURERS OF

Land and Marine Engines and Steam Pumps,

SOLE OWNERS AND MANUFCTURERS OF

Chase Fog Whistle Machine.

Over 150 in use on the best class of Lake Steamers.

Special Attention given to

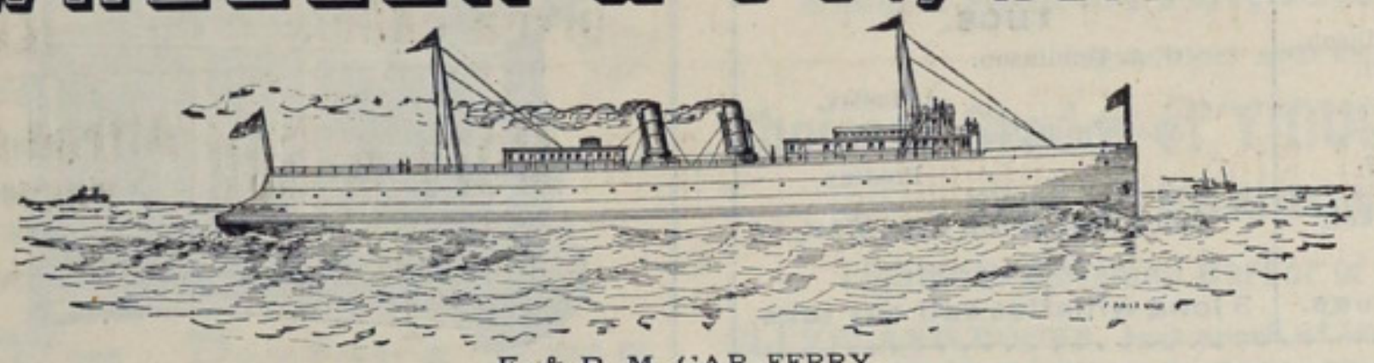
MARINE REPAIR WORK.

Engineers' Supplies.
Asbestos Pipe and Boiler Covering.

TELEPHONE 984.

F.W. WHEELER, President. H. T. WICKES, Vice-President. C. W. STIVER, Secretary. JNO. S. PORTER, Treasurer.

F. W. WHEELER & CO., West Bay City, Mich.



F. & P. M. CAR FERRY.

Builders of all kinds of METAL AND WOODEN SHIPS.

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & S." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

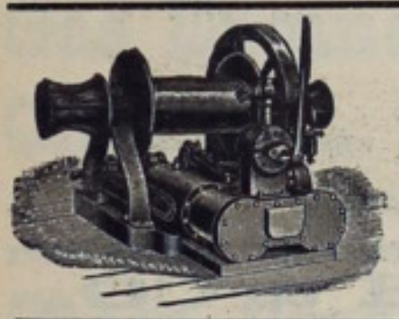
AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, Ohio.



DOCK and DECK HOISTS

ALL KINDS OF

Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH, SAGINAW, MICH.

HOWARD H. BAKER & CO.

Ship Chandlers and Sail Makers,

18 to 26 Terrace. BUFFALO, N.Y.

H. CHANNON COMPANY

Ship Chandlers and Sail Makers.

AGENTS FOR

RYLANDS BROS.

MANUFACTURERS OF

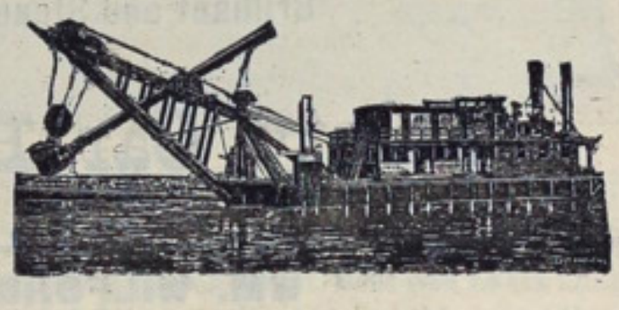
ENGLISH GALVANIZED STEEL HAWSERS,

24-26 Market Street, CHICAGO, ILL

THE L. P. & J. A. SMITH CO.,

Contractors of Public Works.

Dredging, Pile-Driving, Breakwaters, Dry Docks and Pier Building,



Railroads, Canals, Bridges, Foundations, Etc., etc.

23 River St., CLEVELAND, O.

H. E. STEVENS. TOM MEAD. LEW PRESLEY

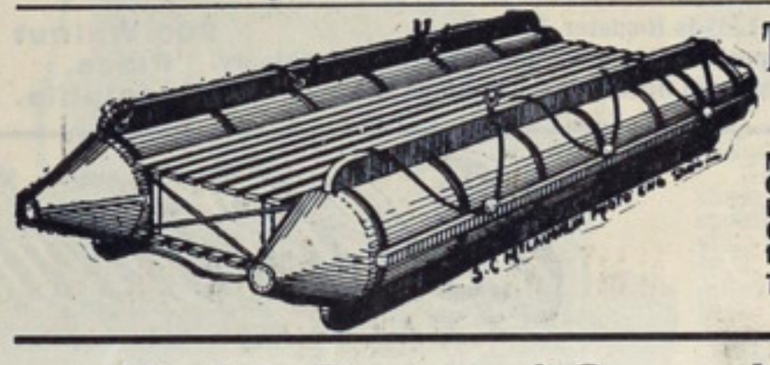
BUCKEYE STEAM FITTING CO.

Steam Fitters, Engineers Supplies,

Phone 4058. AGENTS FOR

RAINBOW PACKING.

Open Day and Night. 117 River St., CLEVELAND, O.



Thos. Drein & Son,

BUILDERS OF

Metallic Life Boats and Rafts, Government and Pleasure Boats. Block and Granulated Cork Life Preservers. Outfit for Lake Steamers a Specialty.

TATNALL & RAILROAD STS. Wilmington, Del.

Yacht, Boat and Canoe Hardware, Boats, Oars and Cordage,

L. W. FERDINAND & CO., 176-184 Federal St., Boston, Mass.

FOR SALE.

Steam Yacht in first-class Condition.

Capacity 5 tons. Dimensions are 40 feet long, 8 feet beam and 3 feet draft. Inquire of

BENHAM & KARR, 165 River St., Cleveland, O.

SUITABLE FOR DELIVERY PURPOSES.

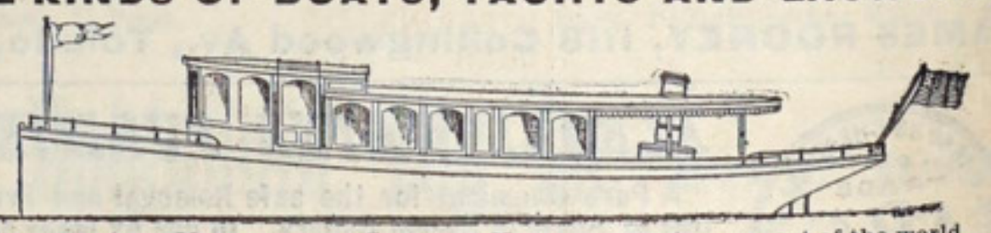
Paint your Vessels with **Superior Graphite Paint.**

NO BLISTERING, CRACKING OR SCALING.

Made especially for Stacks, Decks, Sides, Hulls and Water Compartments. Strictly anti-rust, and most durable and economical.

DETROIT GRAPHITE MFG. CO., 541 River St., Detroit, Mich.

ALL KINDS OF BOATS, YACHTS AND LAUNCHES



Frames set up, MARKED AND SHIPPED KNOCKDOWN to any part of the world.

Send 50 cents for "ALBUM OF DESIGNS"; 72 Pages, 43 Subjects, 66 Designs.

Address Station A. FRED W. MARTIN, Yacht Designer, NORTH CHICAGO ILL. (Formerly of Racine, Wis.)

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

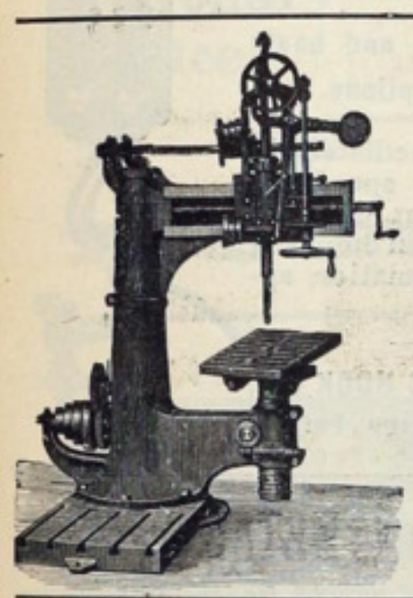
Fred'k Baldt, President. W. M. Gelston, Vice-President
W. S. Bickley, Sec'y and Treas,

Baldt Patent Stockless Anchor.

Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

Many points of superiority over ordinar Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.
WALTER MILLER, Western Reserve Bldg., Cleveland, Ohio,
Representative for the Great Lakes.
☞ New catalogue containing valuable tables sent on application.



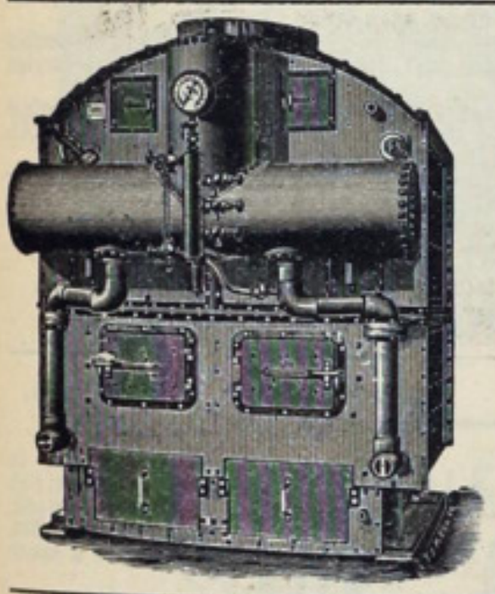
Bement, Miles & Company,

PHILADELPHIA, PA.
MANUFACTURERS OF
Metal Working Machine Tools

For Ship Yards, Railroad Shops, Locomotive and Car Builders, Machine Shops, Rolling Mills, Steam Forges, Boiler Shops, Bridge Works, etc., etc.

Steam Hammers, Steam and Hydraulic Riveting Machines.

New York Office: Taylor Bldg. No. 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.



ALMY'S PATENT
SECTIONAL
Water • Tube • Boilers.

NOW USED IN
18 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers are giving most excellent results.

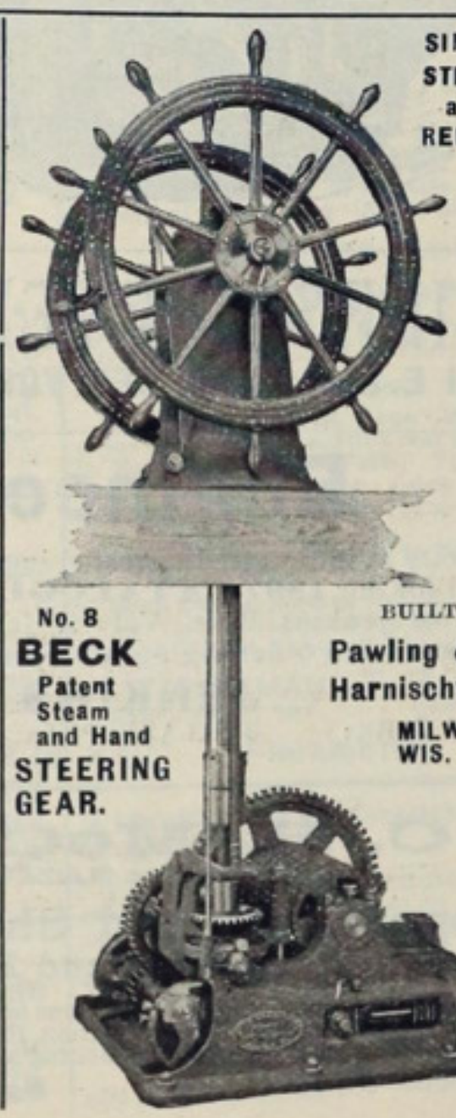
ALMY WATER-TUBE BOILER CO.,
No. 178-184 Allens Avenue, near Rhodes St.
PROVIDENCE, R. I.

VANDUZEN Steam JET PUMPS

THE BEST IN THE WORLD.
Pumps any kind of Liquid. Always in order. Never clogs nor freezes. Fully Guaranteed. COST $7 AND UPWARD. Especially useful for Mines, Quarries, Pits, Wells, Clay Pits, Breweries, on Steamships, Ferryboats, Sugar Plantations, etc. A full stock always on hand.

Descriptive Catalogue and Prices furnished Free. **THE E. W. VAN DUZEN CO., Cincinnati, O.**

For Stationary, Portable, Traction Engines, Tugboats, &c.
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.



SIMPLE, STRONG and RELIABLE.

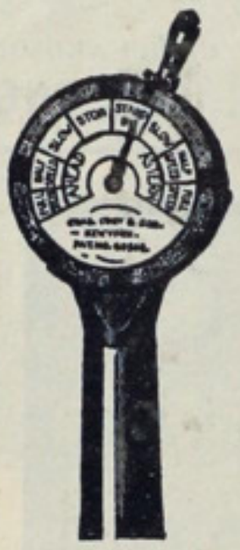
Changed from Steam to Hand by one Lever in Less Than One Second

No. 8
BECK
Patent Steam and Hand
STEERING GEAR.

BUILT BY
Pawling & Harnischfeger,
MILWAUKEE, WIS.

Chas. Corv & Son

Manufacturers of the
Mechanical and Electric Marine Telegraph,



Electrical Helm Indicators
Electric Call Bells.

Engine Bells and Brass Work of all descriptions, Shrieking and Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

Alfred B. Sands & Son

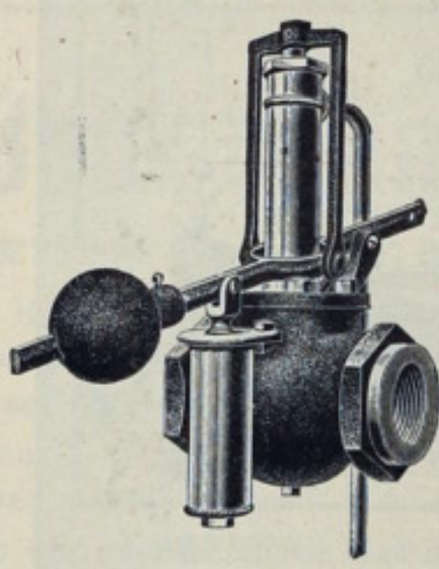
YACHT PLUMBERS,
AND MANUFACTURERS OF
YACHT PLUMBING SPECIALTIES.

Patent applied for.

The only pump water closet in the world so constructed as to be positively free from danger of flooding.

Folding Lavatories, Pumps, Ventilators, Etc., Etc.

134 Beekman St., NEW YORK.



The "DAVIS" Pressure Regulator and Reducing Valve.

Is the simplest and best for reducing the pressure to Steam Steering Engines, Donkey Engines, Steam Winches and all places requiring a uniform pressure below that of boilers.

No diaphragms, spring or packing.

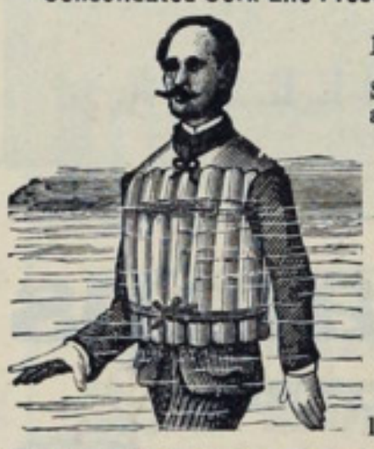
Cut shows ball weight. We can furnish scale weights if preferred.

MANUFACTURED BY
G. M. DAVIS & CO.
106 N. Clinton St., CHICAGO, ILL.
FOR SALE BY
R. E. Hills, Chicago. C. H. McCutcheon, Buffalo
Geo. Worthington Co., Cleveland.
P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit
Jas. Clements & Son, Bay City, Mich.
Cleveland Ship Building Co., Cleveland.
Chicago Ship Building Co., Chicago.

Selling agents—The McIntosh-Huntington Co., Cleveland, O.; The Detroit Sheet Metal and Brass Works, Detroit, Mich.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors
Consolidated Cork Life Preservers. Superior to all others. **Ring Buoys and Fenders.**

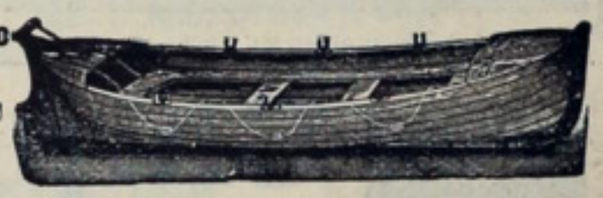


SAFEST, CHEAPEST. Approved and adopted by U. S. Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Vessels and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition

Metallic and Wooden Life Boats.



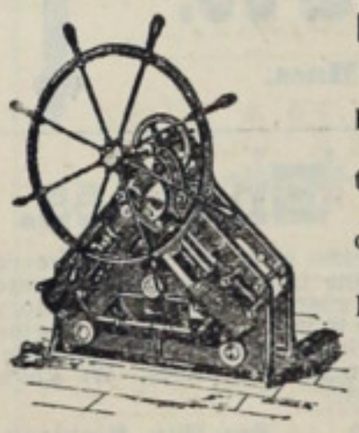
Metallic Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.
Get our prices before buying elsewhere.

D. KAHNWEILER,
437 Pearl Street, NEW YORK CITY.

SHERIFFS STEAM STEERER.



MADE IN TWO SIZES

Are easy to adjust and can be handled by any one.

The Steerer can be arranged to set in pilot house or aft.

No Steerer will be sold without a quadrant.

Steerer will be sold on approval.

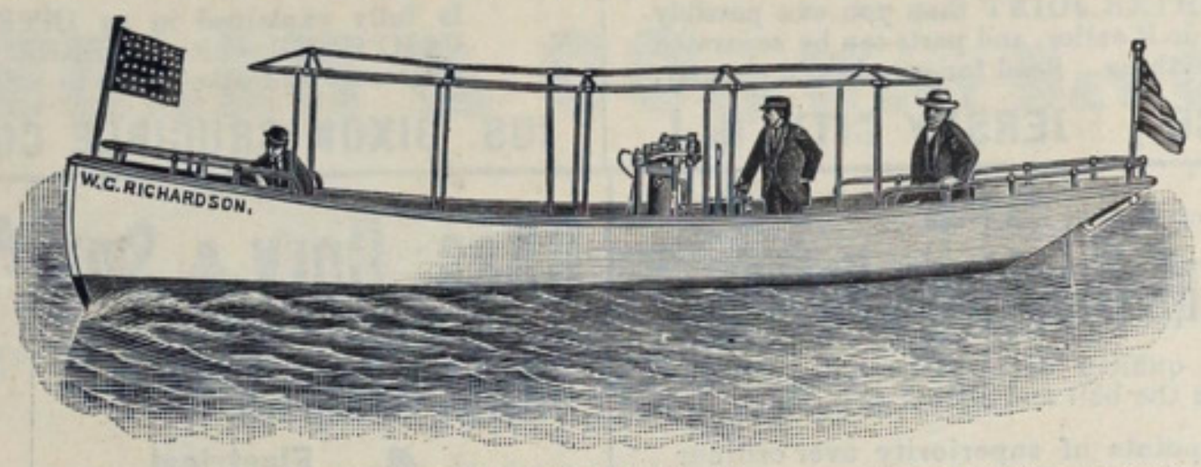
Manufactured by
SHERIFFS MFG. CO.
126-130 Barclay Street.
MILWAUKEE, WIS.

The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.

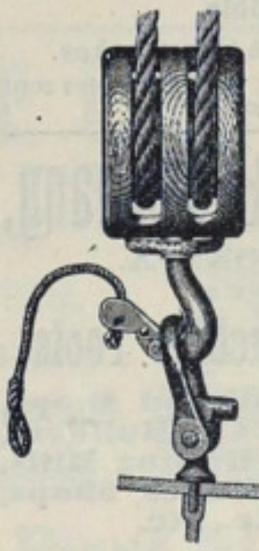


Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE . . . . . McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.



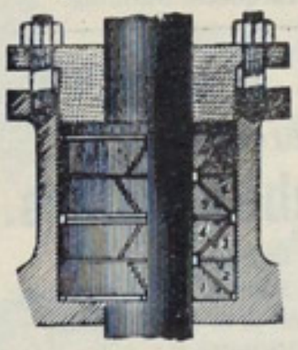
STANDARD AUTOMATIC RELEASING HOOK

For NAPTHA LAUNCHES and boats of all sizes and descriptions.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on. For further information apply to

STAND'T AUT. RELEAS'G HOOK CO.,
22 and 24 State Street, New York.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

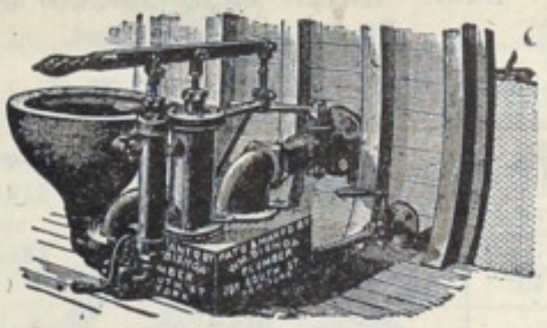
Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

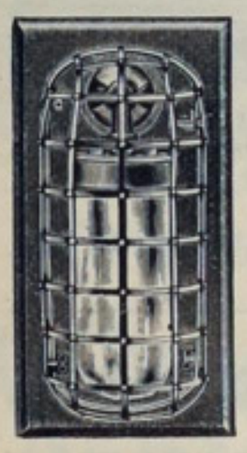
Patent Pump Water Closet.



For Yachts, Pilot Boats, Naval Ships, Etc.

For above or below water line. In use on U.S. Cruiser New York, Columbia, and Battleships Indiana, Maine, Texas, Massachusetts, Etc. Our No. 4 can be put in a space 14 in. x 15 in.

WILLIAM BISHOP & SON,
205 South St., NEW YORK.
724 Third Av., BROOKLYN.
Telephone 569 Franklin.
Yacht Fittings a Specialty.



Ship Lamps

OIL AND ELECTRIC FIXTURERS

— FOR —

Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

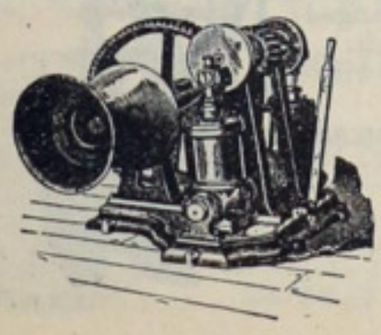
347 to 357 Cambridge St. Boston, Mass.

MIERS CORYELL

21 E. 21st Street, NEW YORK.

Consulting Mechanical Engineer,

Plans, Specifications and Superintendence. Marine and Water Works Engines and Boilers.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., Bay City, Michigan.

Engineers and others

directly or indirectly interested in power or Steam Heating Plants, should send for our **1897 CATALOGUE**, mailed free. Contains full description of Jenkins Bros. Valves, Jenkins '96 Packing, Sellers Restarting Injectors and other high-grade Steam Specialties.

JENKINS BROTHERS,

NEW YORK: 71 John St. PHILADELPHIA: 117 N. 4th St. BOSTON: 17 Pearl St. CHICAGO: 31-33 N. Canal St

---

C. H. McCUTCHEON,

(Successor to SAMUEL McCUTCHEON.)

Copper, Tin and Sheet Iron Manufactory,

Steamboat and Engineers' Supplies.

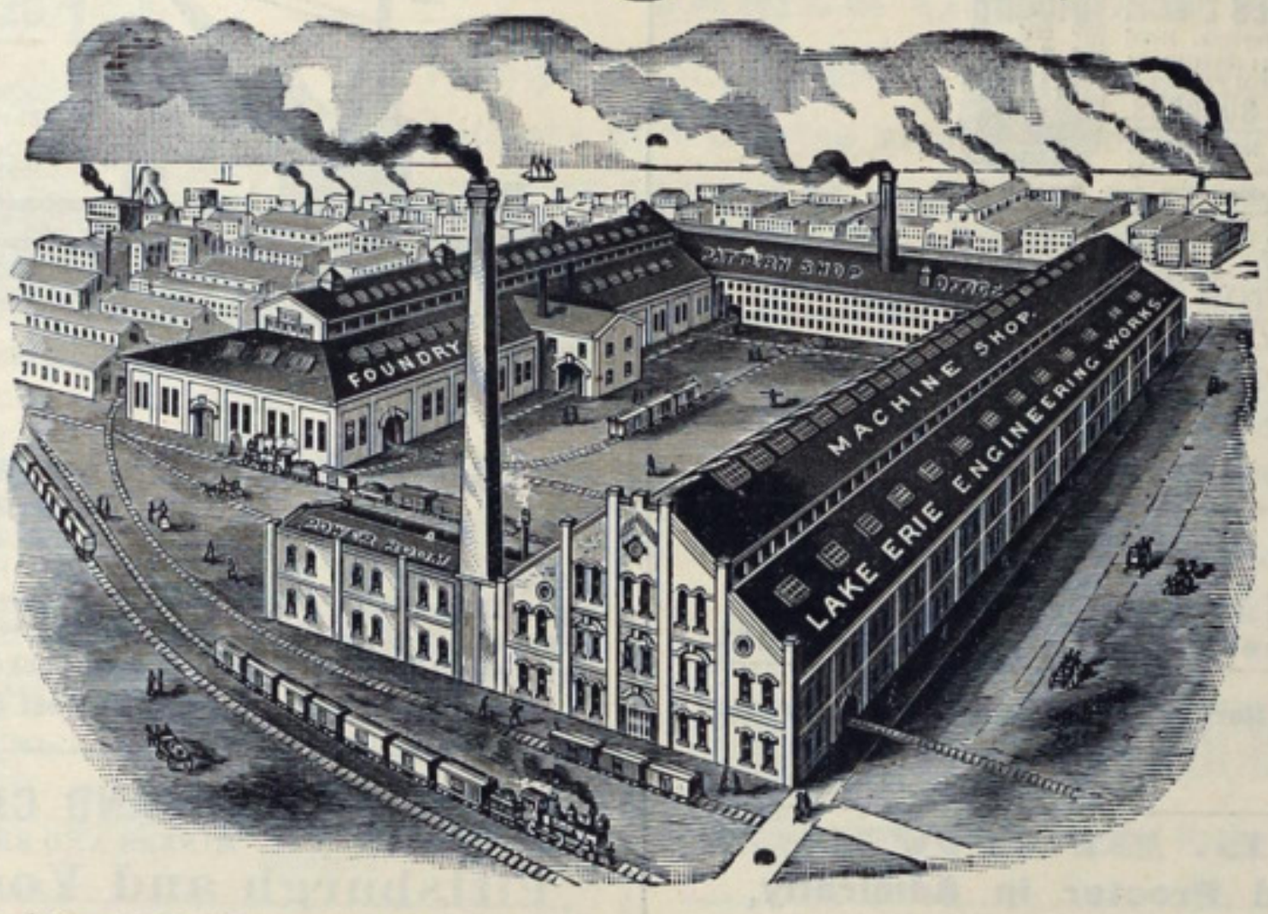
All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c., Leather Belting and Usudurian Packing.

Telephone No. 68. **No. 18 Ohio Street, BUFFALO, N. Y.**

Lake Erie Engineering Works, Buffalo, N. Y.

RICHARD HAMMOND, Pres't. JOHN COON, Sec'y and Treas.

Steam Engines, Compound, Triple and Quadruple Expansion Engines, From 250 to 10,000 Horse Power For Marine and Stationary Service.



Special Designs for Cable Railways and Electric Power Plants.

The Best Economy and Regulation Guaranteed.

THE BEST EQUIPPED PLANT IN AMERICA.

ADVERTISING RATES ON APPLICATION.
COPY OF BOOK AND NAME IN DIRECTORY $5.
BLUE BOOK OF AMERICAN SHIPPING
409 PERRY-PAYNE BLDG. CLEVELAND, O. U.S.A.
CONTAINING PARTICULARS OF ALL THE PRINCIPAL COAST AND LAKE STEAM AND SAIL VESSELS
A DIRECTORY OF SHIP AND ENGINE BUILDERS AND THE MARINE BUSINESS OF THE UNITED STATES.
FOR CIRCULARIZING ★ LIST OF 1000 NAMES AND ADDRESSES, COVERING THE PRINCIPAL SHIP OWNERS AND BUILDERS OF THE UNITED STATES
3000 NAMES OF CAPTAINS
4000 NAMES OF ENGINEERS
ON FILE IN THE PRINCIPAL MARINE ORGANIZATION HEADQUARTERS OF THE WORLD.
HANDSOMELY ILLUSTRATED
USED BY SHIP BUILDERS AND OWNERS FOR GETTING PRICES ON MATERIAL AND SUPPLIES
THE ONLY BOOK OF THE KIND PUBLISHED IN THE U.S.

1897 Blue Book of American Shipping.

"IT IS BETTER TO BOAST AFTER THE BATTLE."

The publishers of the Blue Book are using their energy to make the 1897 Blue Book more valuable than the 1896 Blue Book. Last year we promised to get out a book that would be satisfactory. The result exceeded all expectation and was pronounced far superior to any lake directory ever published.

The value of a directory consists in the frequency to which it is referred to. The Blue Book is used three times to one, more than any other—because it is reliable.

If you want to advertise in or subscribe for the best marine directory ever published, write, at once,

BLUE BOOK OF AMERICAN SHIPPING, 409 Perry-Payne Bldg., CLEVELAND, O.

The Coast Line to MACKINAC
—TAKE THE—

TO MACKINAC DETROIT PETOSKEY CHICAGO

New Steel Passenger Steamers

The Greatest Perfection yet attained in Boat Construction—Luxurious Equipment, Artistic Furnishing, Decoration and Efficient Service, insuring the highest degree of

COMFORT, SPEED AND SAFETY

FOUR TRIPS PER WEEK BETWEEN

Toledo, Detroit and Mackinac

PETOSKEY, "THE SOO," MARQUETTE AND DULUTH.

LOW RATES to Picturesque Mackinac and Return, including Meals and Berths. From Cleveland, $18; from Toledo, $15; from Detroit, $13.50.

DAY AND NIGHT SERVICE.

Between Detroit and Cleveland

Connecting at Cleveland with Earliest Trains for all points East, South and Southwest and at Detroit for all points North and Northwest.

Sunday Trips June, July, August and Sept. Only.

EVERY DAY BETWEEN

Cleveland, Put-in-Bay and Toledo

Send for Illustrated Pamphlet. Address

A. A. SCHANTZ, G. P. A., DETROIT, MICH.

The Detroit & Cleveland Steam Nav. Co.

$2.50 CLEVELAND To BUFFALO

ALSO DAILY LINE BETWEEN

CLEVELAND AND TOLEDO,

Via "C. & B. LINE."

Steamers "City of Buffalo," (new) "State of Ohio" and "State of New York"

DAILY TIME TABLE.

Sunday Included May 30 to October 3.

Lv. Cleveland	7:00 P.M.	Lv. Buffalo	7:30 P. M
Ar. Buffalo	7:30 A.M.	Ar. Cleveland	7:30 A. M

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and enjoy a refreshing night's rest when enroute to **Buffalo, Niagara Falls, Toronto, New York, Boston, Albany, 1,000 Islands,** or any Eastern or Canadian Point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet. For further information ask your nearest Coupon Ticket Agent or address,

W. F. HERMAN, GEN'L PASS. AGT. **T. F. NEWMAN,** GEN'L MANAGER,

CLEVELAND, O.

APPOINTMENTS of Captains and Engineers for 1897.

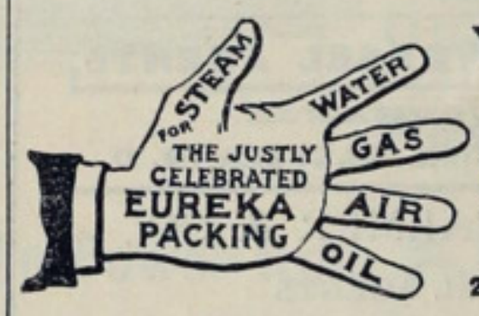
The most complete published. Arranged for reference by fleet and by vessels with names alphabetically arranged.

Necessary to everyone who has business with captains or engineers.

PRICE $1.00.

MARINE REVIEW,

409 Perry-Payne Bldg., Cleveland, O.



YOU ARE A BACK NUMBER

if you don't know how to use an INDICATOR, or carry in your closet some EUREKA. Send for our catalog and easy terms of payment for INDICATOR.

JAS. L. ROBERTSON & SON,

204 Fulton St., N.Y. 12 Pearl St., Boston

EVERY MARINE ENGINEER on the Lakes, and every second who is studying for first class papers, ought to possess

Reed's Engineers' Hand Book

(Fifteenth Edition.)

Containing 600 engravings and a portfolio of drawings of all parts of marine engines.

It has always sold for $4.50 and $5. Until Dec. 1 any subscriber to the REVIEW may have a copy sent post paid by enclosing this advertisement and $4 to

Marine Review,

BOOK DEPT. 409 Perry-Payne Bldg., CLEVELAND, O.

STEAM ENGINEERING

(Stationary, Locomotive, Marine); Mechanical Drawing; Architectural Drawing; Machine Design; Electricity; Architecture; Plumbing; Railroad, Municipal, **31 COURSES** Hydraulic & Bridge Engineering; Surveying and Mapping; Metal Pattern Cutting; Bookkeeping; Shorthand; English Branches; Mining; Metal Prospect'g.

All who study **GUARANTEED SUCCESS.**

Fees Moderate, Advance or Installments.

Circular Free; State subject you wish to study.

International Correspondence Schools, Box 965 Scranton, Pa.

TAUGHT BY MAIL — THOROUGH PRACTICAL

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

ALBERT J. GILCHRIST, PROCTOR IN ADMIRALTY,
No. 604 PERRY-PAYNE BLDG., CLEVELAND, OHIO.

AMBROSE V. POWELL, C.E., * * Consulting Engineer.
Specialties: Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.
Office, 507 Chamber of Commerce, - CHICAGO, ILL.

C. E. KREMER, *Attorney and Counselor-at-Law and Proctorin Admiralty.*
Rooms 14, 15 and 16, Bryan Block. 164 LA SALLE ST., CHICAGO, ILL.

HARVEY L. BROWN,
Counselor at Law and Proctor in Admiralty,
35 White Building, BUFFALO, N. Y.

HAWGOOD & MOORE — W. A. HAWGOOD, J. W. MOORE.
Vessel and Insurance Agents,
Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395. **608 Perry-Payne Bldg., CLEVELAND, O.**

W. C. RICHARDSON,
VESSEL AND MARINE INSURANCE AGENT.
Office Telephone 338.
Residence Telephone 2938. Nos. 606 & 607 Perry-Payne Bldg., Cleveland, O.

J. H. BARTOW, TELEPHONE 717.
Vessel and Insurance Agent,
611 and 612 Perry-Payne Bldg., Cleveland, O.

ALEX. CLARK. J. B. HALL. J. H. KILLERAN, *Marine Surveyor.*
A. Clark & Co. VESSEL AND INSURANCE AGENTS,
Tel. No. 892. 55 Main St., BUFFALO, N.Y.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO.,
Vessel and Insurance Agents,
508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
Office Telephone, 737. Reidence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
FIRE AND MARINE INSURANCE.
Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

THOS. WILSON,
MANAGING OWNER
WILSON'S TRANSIT LINE.
Gen. Forwarder.
Freight and Vessel Agent.
CLEVELAND, O.

J. T. ROSE. FRANK B. LAZIER.
ROSE & LAZIER.
Vessel Agents and Brokers, and Marine Insurance,
16 Board of Trade,
DULUTH, - - MINN.

PATENTS

QUICKLY SECURED. Trade-marks and Copyrights registered and patent business of every description promptly and skillfully conducted at lowest rates. Inventions introduced, companies formed, and PATENTS SOLD ON COMMISSION. 25 years' experience. Highest references. Send us model, sketch or Photo. of invention, with explanation, and we will report whether patentable or not, free of charge. OUR FEE PAYABLE WHEN PATENT IS ALLOWED. When patent is secured we will conduct its sale for you without extra charge. 32-PAGE HAND-BOOK and list of 200 inventions wanted mailed to inventors free upon request. This is the most complete little patent book published and every inventor should WRITE FOR ONE.
H. B. WILLSON & CO., Patent Solicitors, Le Droit B'ld'g. WASHINGTON, D. C.

PALMER & CO.,
VESSEL AGENTS
AND UNDERWRITERS,
713 Perry-Payne Bldg., Cleveland, Ohio.
Telephone 644.

J. J. H. Brown. Edward Smith. J. B. Rodgers.
BROWN & CO.,
Vessel and Insurance Agents,
202 Main St.,
BUFFALO, N. Y.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—
Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, - OHIO.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty.
Rooms 722 and 723 Perry-Payne Bldg.
CLEVELAND, OHIO.
Telephone 2585.

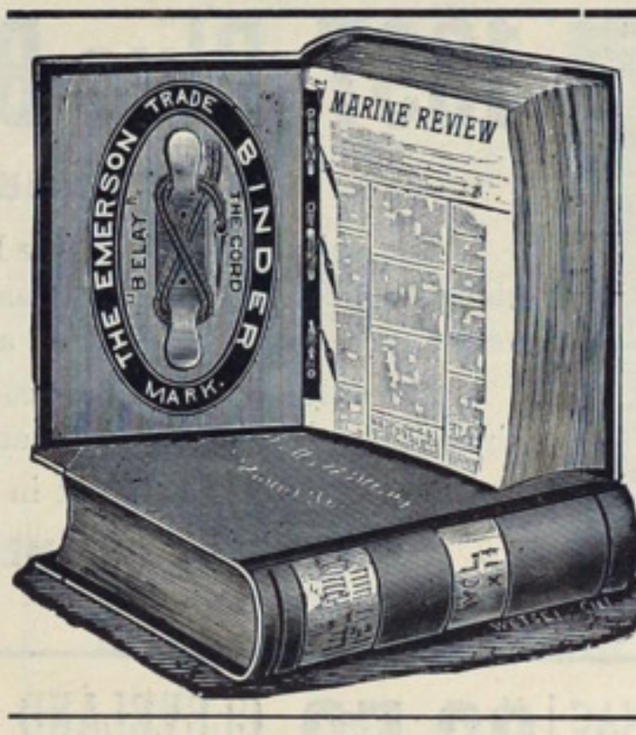
C. W. ELPHICKE. JAS. A. MYERS. CALVIN CARR.
C. W. ELPHICKE & CO.
GENERAL INSURANCE AGENTS.
Room 10, No. 6 Sherman St., Chicago, Ill.

Pickands, Mather & Co.,

FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.
At DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any time during Day or Night.
Western Reserve Building, CLEVELAND, O.

Ohio & Pennsylvania Coal Co.
FUEL DEPARTMENT.
MINERS AND SHIPPERS,
Youghiogheny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.
Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

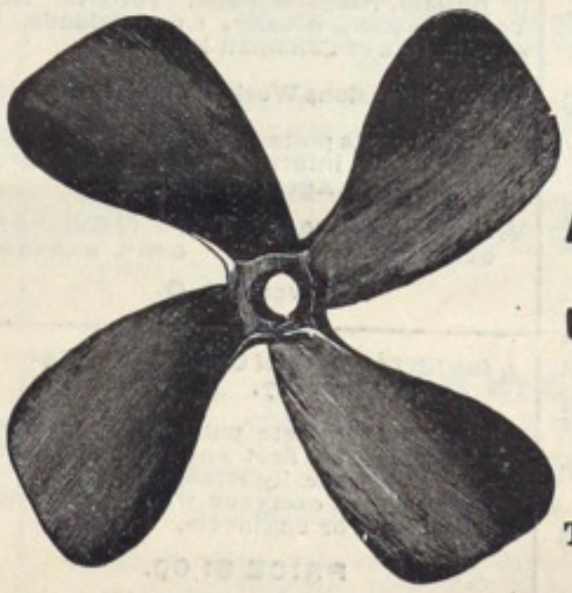
THE PITTSBURGH AND CHICAGO GAS COAL CO.
MINERS AND SHIPPERS OF
Pittsburgh and Youghiogheny Coal.
Fuel Docks West Side of Main River, Cleveland, Ohio, just above Main St. Bridge.
Latest equipment for rapid fueling of Steamers at all hours, day or night.
Fuel Lighter 300 tons capacity; buckets 2½ tons capacity.
Telephone { Office 1888. Fuel Dock 1590. Ore Dock, 2413.
J. A. DONALDSON, Agent, 420-421 Perry-Payne Building.



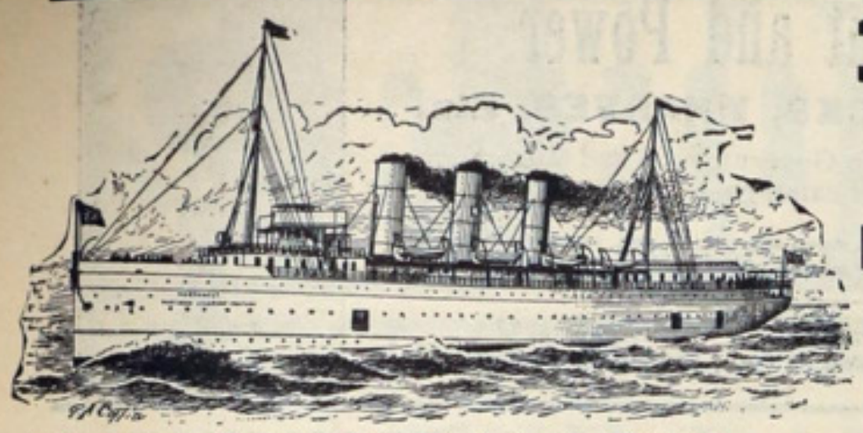
ONE OF THESE BINDERS
that will hold 52 NUMBERS of the
MARINE REVIEW,
Will be mailed to any address on receipt of $1.
MARINE REVIEW...
409 Perry-Payne Bldg.,
CLEVELAND, O.

H. A. BARR, PRESIDENT, Escanaba. F. H. VAN CLEVE, SEC. Escanaba. CAPT. GEO. BARTLEY, SUPT. Escanaba.
ESCANABA TOWING & WRECKING CO., Escanaba, Mich.
Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.
CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y..
MANUFACTURERS OF
TRIPLE EXPANSION, THREE CYLINDER, FORE AND AFT And STEEPLE COMPOUND MARINE ENGINES,
High and Low Pressure Engines, Sectional. Propeller, Tug and Yacht Wheels.
Cowles Aluminum and Manganese Bronze Propeller Wheels.



These Wheels are noted for their extra speed, towing power and proportionate saving of coal.
PRICES QUOTED ON APPLICATION.



RAPID FUELING DOCKS, DETROIT RIVER.

JAMES CRAHAM & CO.,

Foot Twenty-first St., Detroit, Below Routes of Passenger and Car Ferry Lines.

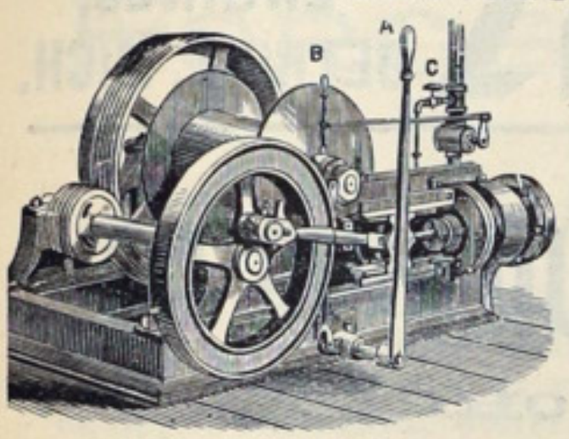
Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL. Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Shippers of Coal by Rail and Water. **Office 1005 Chamber of Commerce. Phone 2083.**

WILLIAMSON BROS.

Cor. Richmond and York Sts., PHILADELPHIA, PA.



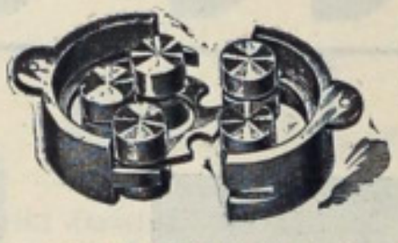
Hoisting Engines and Ship Steering Engines.

With either Frictional, Spur or Worm Gear of various Patterns to suit all purposes.

Over 150 of the largest and most modern lake steamers have our steerers.

FERRALL'S PATENT

Long Bearing Self-Adjusting 5 Roll Sheave



Has no rivets in its construction, therefore is made stronger, having an interior separator to prevent the rolls from touching each other, and an interior rail to guide the rolls.

BAGNALL-LOUD BLOCK CO.

162 Cemmercial Street, . - - BOSTON, MASS.

THE W. L. SCOTT CO.

Wholesale Dealers in

Shamokin, Wilkesbarre, and Hazleton-Lehigh

COALS.

Mansfield Steam Coal.

FUELING VESSELS a specialty, either from dock or steam scow **Mansfield**, capacity 300 tons, in buckets, which gives quick dispatch. Boats coaled day or night. Docks lighted with electricity and equipped with steam derricks.

Fueling Office at Canal Dock, ERIE, PA.

The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

Steamboat Fuel Dock. Blackwell Canal at Michigan St. Bridge. 1400 feet dock frontage.

Steam Elevator and 4 Steam Derricks. Steam Fuel Scow, Capacity 550 Tons. Boats Coaled Day or Night.

OFFICE: 694 Ellicott Square Bldg., BUFFALO, N. Y.

TELEPHONES: Ellicott Square Bldg., Seneca 371 A. Dock, Seneca 371 D.

WM. H. HAZEN,
Dock Superintendent.

10,000 IN USE.

Unaffected by Weather.

Portable, Self Contained.

800 to 4000 Candle Power from KEROSENE OIL.

Especially adapted for Contractors, Quarries, Shovels, Railroad Construction, Dredges, Bridge and Dock Builders, Water-Works, Brick Yards and Coal Docks.

400 RAILROADS and over **300** CONTRACTORS now use the WELLS LIGHT.

The Wells Light Mfg. Co.

EDWARD ROBINSON, Sole Proprietor.

46 Washington Street, NEW YORK.

MARINE VALVE OIL FOR INTERNAL LUBRICATION. RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION

STANDARD OIL COMPANY, MARINE VALVE OIL, CLEVELAND, O.

Marine Valve, Renown Engine, Eldorado Engine, Crank Case, Victor Signal, Dark Lubricating, Mineral Seal, Head Light, Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

TELEPHONE 77. **123 River Street, CLEVELAND, O.** MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY **STANDARD OIL COMPANY,**

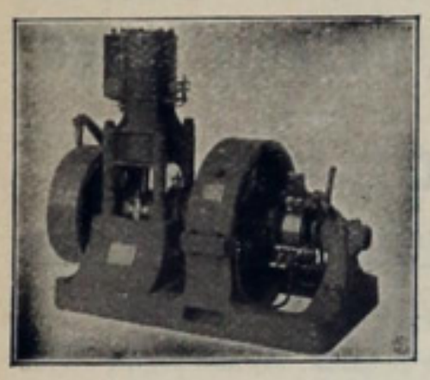
Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis,
Duluth, Minn,
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M. C. Ry. & 10th St
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.

STANDARD OIL COMPANY, RENOWN, ENGINE OIL, CLEVELAND, OHIO.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.

EDWARD BRAMMALL, Bnton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.

A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY CO., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo O



Complete Electric Plants for Light and Power

On STEAMSHIPS, WHALEBACKS, YACHTS, DOCKS, WHARVES, Etc.

Our system is complete in every detail. All our appliances are made to Governmental and Insurance requirements and are perfect. Write for prices and catalogues.

General Electric Company.

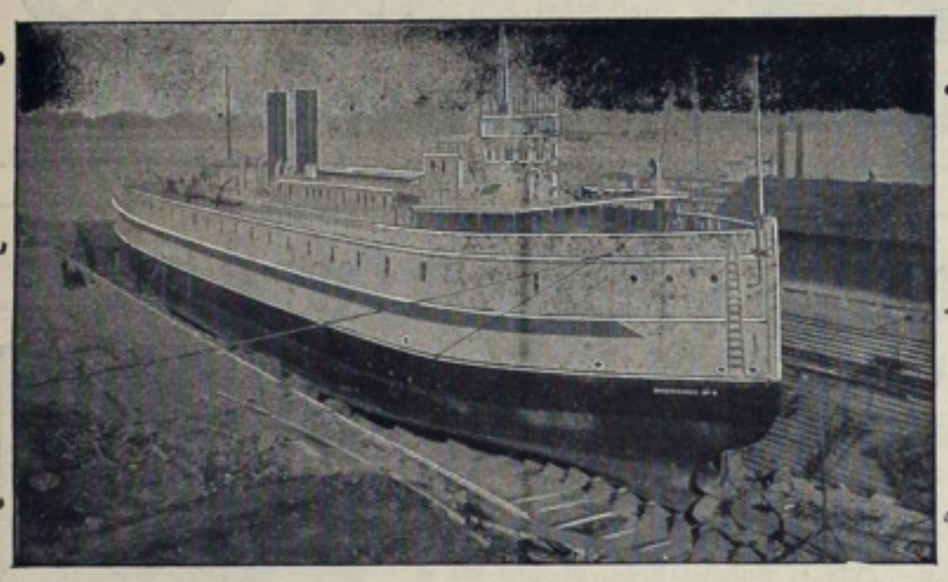
SALES OFFICES

Schenectady, N. Y. Chicago, Ill. Detroit, Mich. Buffalo, N. Y. Columbus, O.
Boston, Mass. Philadelphia, Pa. Baltimore, Md. Portland, Ore. San Francisco, Cal.
New York, N. Y. New Orleans, La.

FRONTIER IRON WORKS

MARINE ENGINES,

DETROIT, MICH.



Shenango No. 2, 300 feet long, 54 feet beam.

CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,

Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships

A Specialty.

THE BETHLEHEM IRON CO.

Works & Principal Office, **South Bethlehem, Penn.**

Marine Engine Forgings

of all descriptions, made either SOLID or HOLLOW from Fluid-Compressed Hydraulic-Forged Open Hearth Steel.

Ship-Plates. Boiler-Plates. Tank-Plates.

NEW YORK OFFICE, - - 100 Broadway.
PHILADELPHIA OFFICE, - 421 Chestnut St.
CHICAGO OFFICE, - - Marquette Bldg.

The United States Standard Register of Shipping.

Providing the only Standard Classification based on Construction Rules Designed for Lake Vessels.
Classed Vessels Receive the Lowest Rates of Insurance.

SURVEYORS.

SINCLAIR STUART, Surveyor of Iron and Steel Construction and Engineer Surveyor.

.....Surveyor for District comprising Lakes Superior, Michigan and Huron and Lake Erie, as far East as, and including Cleveland, O.

EDWARD CASKIN, Potter Building, Main Street, Buffalo, N. Y., Surveyor for District comprising Lake Ontario and Lake Erie, as far West as, but not including Cleveland, O.

Application for survey of vessels and subscriptions to Register Book will be received by the surveyors or at the office of

The United States Standard Steamship Owners', Builders' & Underwriters' Ass'n, Ltd.
Post Building, 16 and 18 Exchange Place, . NEW YORK.

Cuddy-Mullen Coal Co.

Miners and Shippers of Steam Coal.

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—
Car Dumper; Eight Pockets 1,000 tons capacity; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—
Amherstburg, Four Pockets and Three Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

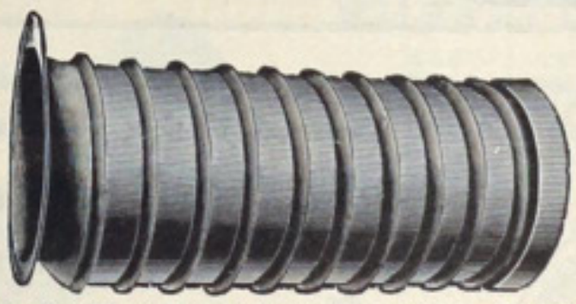
SAULT RIVER BRANCH—
Two Docks at Detour (formerly known as the Anthony and Watson Docks) **Equipped with Pockets and Steam Derricks.**

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

PURVES' RIBBED STEEL BOILER FURNACE FLUE.

BACK END.



FRONT END.

With this style of Furnace Flue, the rivets at the "back end" are out of the line of fire, and all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of Flue has been in use six years without a single complaint.

Over 16,000 of Purves' Ribbed Steel Furnace Flues in successful use in Marine Boilers.

ELLIS & EAVES SYSTEM OF INDUCED OR SUCTION DRAFT.

CHARLES W. WHITNEY,
Sole Agent for the United States and Canada,
Bowling Green Building, 5 to 11 Broadway, New York City.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

THE BABCOCK & WILCOX CO.

29 CORTLAND STREET,
NEW YORK.

FORGED STEEL WATER-TUBE MARINE BOILER,

Light, durable, easily cleaned and inspected. Only straight tubes are used.
The largest cargoes on the Lakes are carried by steamers using BABCOCK & WILCOX boilers.
The fastest of the six composite Gunboats recently constructed for the U. S N. (MARIETTA and ANNAPOLIS) are equipped with these boilers.
Boilers also ordered for U. S. N. CHICAGO and ATLANTA.

BAR IRON — THE BOURNE-FULLER CO. — PIG IRON

CLEVELAND, O.

SHIP PLATES, BOILER PLATES,
ANGLES, BEAMS, CHANNELS, BARS,
BOAT SPIKES, CLINCH RINGS,

SALES AGENTS:

THE CAMBRIA IRON CO.

Mfrs. of Open Hearth and Bessemer Steel.

De Grauw, Aymar & Co.,
34-35 South Street,
NEW YORK, N. Y.

Sole Selling Agents in the United States for

TYZACK'S STOCKLESS ANCHORS

Over 100 of these Anchors on Lake Vessels.

DETROIT SHEET METAL AND BRASS WORKS

No. 64-66-68-70-72 ORLEANS STREET, DETROIT, MICH.

Jobbers of..... Pipe, Valves, Fittings. Packing, Oil and Engineers Suplies.

Contractors for High Class Steam Fitting, Steam Heating, Plumbing, Copper Work, and all Classes of Sheet Metal Work.

Manufacturers of Clark's Patent Metallic Life Raft, Side Lights, Marine Hardware, Hurricane, Cabin and Platform Lamps, Trip Gongs, etc.

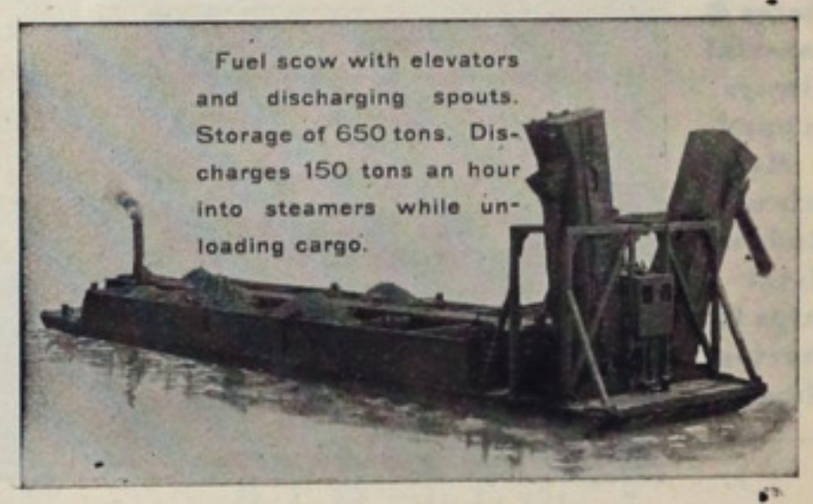
Agents for..... Laidlaw - Dunn - Gordon Steam Pumps, Warren Webster's Specialties, and Buffalo Forge Co.'s Fans, Engines and Heaters.

Engineers can be waited on promptly day or night.

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.

Lighter Carrying Different Grades at all Times.


Fuel scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.

M. A. HANNA & CO.,

Main Office, Perry-Payne Bldg., Cleveland. Miners and Shippers.

THE GEO. F. BLAKE MFG. CO.

AIR PUMP ON U.S. CRUISER NEW YORK.

BUILDERS OF

MARINE PUMPS

Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.

ECLIPSE SECTIONAL RAINBOW GASKET.

3/8-INCH FOR PIPE UNIONS.
1/2-INCH FOR HAND HOLES.

5/8-INCH FOR REGULAR SIZE.
3/4-INCH FOR LARGE SIZE.

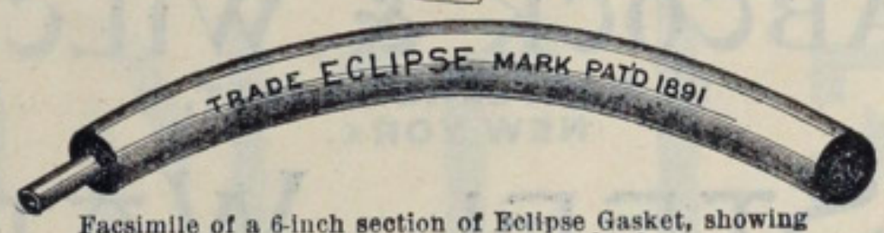
MAN HOLES.

Patented and Manufactured Exclusively by

PEERLESS RUBBER MFG. CO.,

16 Warren Street,

+ NEW YORK. +



Facsimile of a 6-inch section of Eclipse Gasket, showing name and trade mark imbedded.

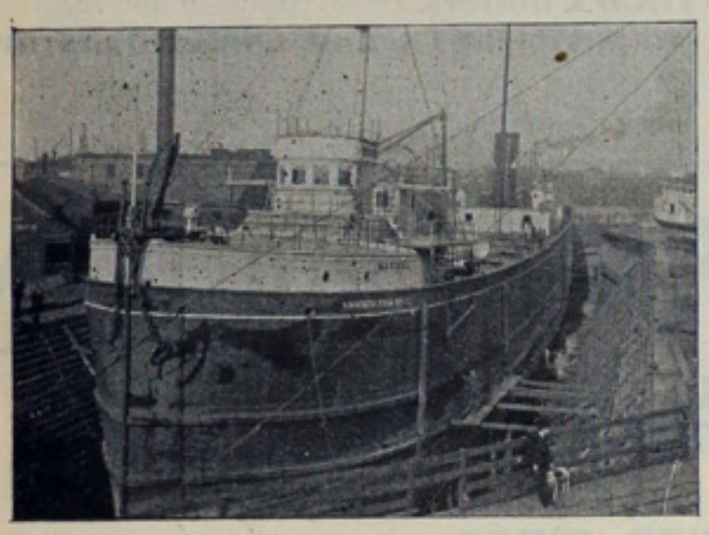
Write for Testimonials.

16-24 Woodward Ave., DETROIT, MICH.

193-195 Bank St., CLEVELAND, O.

202-210 So. Water St., CHICAGO, ILL.

The Cleveland Dry Dock Co.



148 Elm St., Cleveland, O.
Telephone 1616.
Resid. 'Phone 3634.

REPAIRING A SPECIALTY.

Dimensions of Dock:
Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN, Sec'y & Mgr.

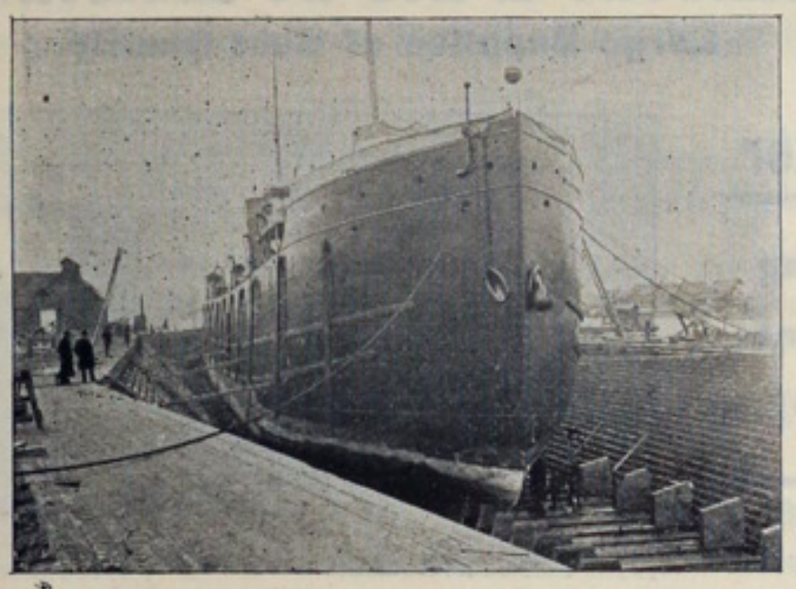
AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classss built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.



Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

H. C. BURRELL

MARINE REPORTER, DETROIT.

Small boat on the river at all hours of the day and night. Let us give you prices on delivery of orders and other business at Detroit. Engineers and firemen, mates and deck hands, furnished on short notice.

Office Foot of Woodward Ave. **Tel. Main 46 B.**

COAL

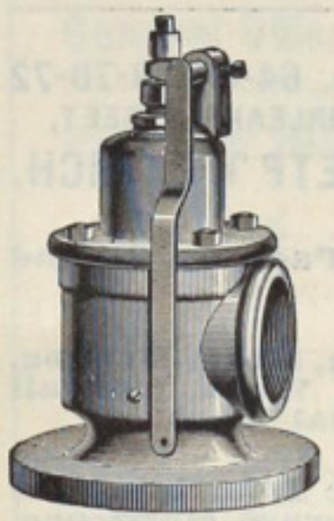
DELTA METAL

REG TRADE MARKS
"Phosphor-Bronze"
DELTA

THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE., PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
—DELTA METAL—
CASTINGS. STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

PROPELLERS.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES. Locomotive, Marine and Stationery.
CROSBY WATER RELIEF VALVES, for Pumps, Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with Sargent's Electrical Attachment for taking any number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil insertion.
BOSWORTH FEED-WATER REGULATOR, PATENT GAGE TESTER, and many other specialties in Steam Lines.

Main Office and Works: **Boston, Mass.**

Stores: Boston, New York, Chicago, and London, Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.

Christian Endeavor Excursion to California—Sleeping car reservations are now made from Chicago via all lines, and all information is given for this wonderfully low rate to California at Nickel Plate city ticket office, 189 Superior street, Cleveland. Call early. 71 June 30